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"Survey our empire and behold our home!"
—BYRON.

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LIPPINCOTT'S HOME MANUALS

EDITED BY
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COLUMBIA UNIVERSITY

LAUNDERING

HOME—INSTITUTION

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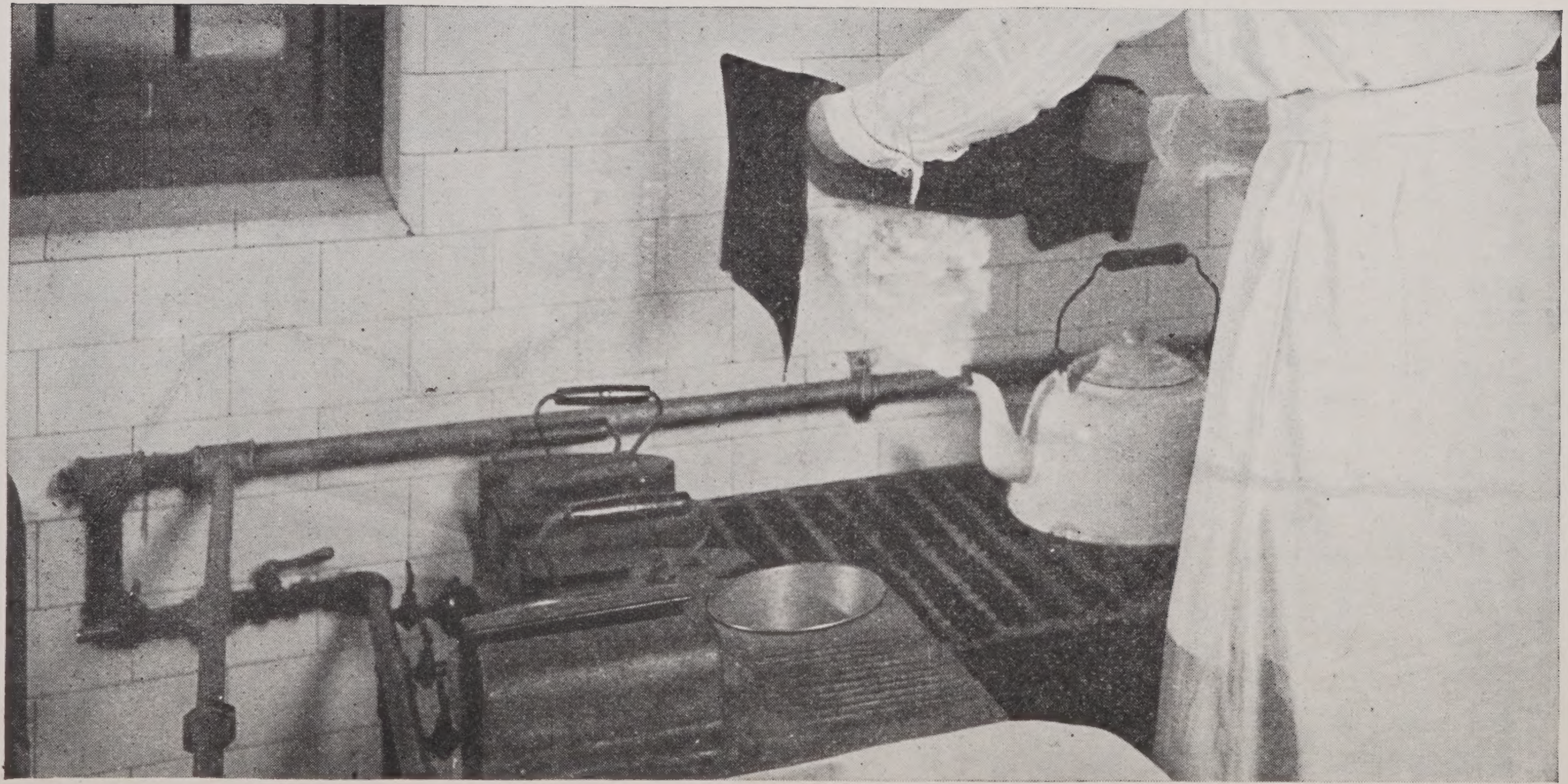

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188 ILLUSTRATIONS IN TEXT

PHILADELPHIA, LONDON AND CHICAGO
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IT IS WITH DEEP FEELING THAT I PRESENT THIS BOOK TO MY FORMER STUDENTS—FROM THE FIRST LAUNDRY CLASS AT DREXEL INSTITUTE, PHILADELPHIA, TO THE PRESENT CLASS AT TEACHERS COLLEGE, COLUMBIA UNIVERSITY

70120

"The poetry of life always has a practical side to it, and most practical affairs rightly worked out are full of poetry."

PREFACE

THE work of laundering presents many problems, in the solving of which both housewives of the small home and directors of institution households are asking help. These problems involve the purchase of equipment and supplies and the practical procedures of the home and the institution laundry. Their truly practical solution must be based on the scientific approach through testing and experiment, investigation and study. The material in this book, gathered through years of such study, is designed primarily to give definite help concerning the proper methods of performing the actual processes involved in cleaning a garment. The discussion covers such points as the effect on laundering processes of fiber, fabric, and color, the best way to conserve these and to secure the desired finish. Such discussion necessarily includes the matter of laundry supplies, how to buy and how to use, concerning which the housewife has hitherto had little aid through the regular purchasing avenues open to her. The study of supplies is here taken up from the viewpoint of their use in washing processes rather than from that of an intensive study of their chemical reactions. Science and practical application have therefore gone hand in hand to provide for the worker a manual of laundry procedure.

One section of the book is devoted to a detailed discussion of equipment—its selection, cost, and care, and evaluation of machines in terms of time- and fatigue-saving. The scarcity of domestic help which has forced the housewife to do her own work has also led her on the one hand to a realization of the economic values in successful renovation and on the other to a consideration of labor-saving equipment as a means of conserving her own time and strength as well as of accomplishing a more satisfactory laundry routine. Unwise buying of laundry equipment can be largely prevented by thoughtful investigation and study along the lines laid down in these chapters. The director of the institution household will find much helpful material on the administrative problems of laundry buildings and equipment and of handling large quantities of linen, while the institution laundry supervisor will find here a practical manual of operation for large scale laundry work.

For teachers in Practical Arts the book may serve as a textbook in domestic and institution laundry courses and as a reference book in the courses on household and institution management. The experience of the author has made possible a chapter on teaching suggestions and outlines of courses which may be helpful in the organization and conduct of laundry courses. The former book called *Laundering* now gives place to this present book, which it is hoped will be of increased value to the groups who may use it.

If the book is of help to those for whom it is written, it is due in large part to the enthusiastic and helpful coöperation of those who have read the manuscript and offered practical suggestions. It is with appreciation and gratitude that the author here expresses her thanks to Mr. Charles McCarty, of the American Laundry Machinery Company; Miss Mary E. Keown, American Washing Machine Manufacturing Association; Mr. J. B. Keary, of H. Kohnstamm Company; Mr. H. Berkowitz, of Bellevue Hospital Laundry; Miss Isabel Lount Evans; Mrs. Ellen B. McGowan; Miss Matilda J. McKeown; Miss Sadie B. Vanderbilt; Miss Lydia Southard. To my co-workers may I give special thanks for their help in the many ways that have made this book possible—to Miss Eva Wilson; to Miss Harriette Jones; to Mrs. Elva Hoover, for her valuable work in assisting in compiling the manuscript; to Professor Emma H. Gunther, for her coöperation and ever-ready incentive.

L. RAY BALDERSTON.

OCTOBER, 1923.

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CONTENTS

CHAPTER PAGE
I. Fabrics........ 1
II. Methods of Cleansing........ 12
III. Method of Removing Stains........ 26
IV. Preparation of the Wash........ 43
V. Process of Washing All Clothes in the Home........ 52
VI. Process of Washing All Clothes in the Institution.... 68
VII. Soap........ 95
VIII. Blues and Bluing........ 107
IX. Starch and Starching........ 115
X. Other Cleansing Agents........ 124
XI. Table Linen and Bed Linen........ 134
XII. Body Linen........ 141
XIII. Colored Clothes........ 153
XIV. Woolens........ 159
XV. Silk........ 166
XVI. Laces........ 172
XVII. Special Cleaning........ 178
XVIII. Dyeing and Dry Cleaning........ 188
XIX. Disinfection of Clothing and Fumigation........ 196
XX. The Home Laundry........ 202
XXI. The Institution Laundry—Establishment of the Plant. 254
XXII. The Institution Laundry—Equipment........ 266
XXIII. Administration of the Institution Laundry........ 307
XXIV. Suggestions for Teachers........ 326
XXV. Development of Laundering........ 357

FOREWORD

FIFTY years ago there was a young student at Vassar College named Ellen Swallow, who had a new and revolutionary idea. She saw in the world about her that the fresh forces of applied science were beginning to revolutionize the processes of industry and the external conditions of human life; and she dreamed of the possibility of applying these forces to the problems of the household. She specialized in Chemistry, became a student and later a member of the instructing staff of the Massachusetts Institute of Technology, married Professor Richards, head of the department of Mining Engineering, and herself attained the very first rank as an authority on sanitary chemistry. Throughout her life, however, she never lost sight of the broader ideal of bringing applied science into the affairs of the home. Her greatest contribution was the establishment in the mind of America of this germinating idea.

Strangely enough the seed which Ellen Richards planted has not yet taken firm root in any of the older eastern colleges devoted solely to the higher education of women. In the coeducational state universities, at Simmons College and, above all, in the School of Practical Arts of Teachers College her conception has borne fruit a hundredfold. The present volume is one of its latest and best manifestations.

The writer is not at all competent to judge of the validity of Miss Balderston's conclusions in regard to the properties of special cleansing agents or the value of a particular type of laundry equipment. He is confident that they are as sound as existing knowledge permits because Miss Balderston by years of study and teaching has made herself the recognized and authoritative leader in the particular field of household science which she teaches. But to any scientific man it must be inspiring to see the full resources of science systematically applied to an important practical problem of daily life. The microscopy of textile fibers, the chemistry of stains and stain removers, the mechanics of laundry machinery, the principles of scientific management are here brought into play to make the processes which our ancestors crudely initiated on the flat stones by a river bank sound and efficient and economical. "Cleanliness is next to Godliness." An appreciable fraction of the life of mankind is devoted to the struggle with dirt, a struggle whose victories result not only in protection against disease but in the promotion of the beauty and the order and the decency of living. To bring the precision of the laboratory into such daily tasks of the household is a service to mankind; and this service Miss Balderston has performed in such fashion as to furnish the housekeeper, the supervisor of an institution laundry, and the teacher of household economics with a complete and authoritative manual of the subject with which she deals.

C.-E. A. Winslow,
Yale School of Medicine.

LAUNDERING

CHAPTER I

FABRICS

Clean clothes are as vital to human welfare as clean food—vital to the community and to the individual. The cleansing of a garment is a necessity, either for sanitary reasons for the health of the individual, or as a cheap way of renewal of the fabric. That this cleansing has been drudgery for so long is due less to the inherent difficulty of the work than to the housewives' ignorance concerning labor-saving devices and methods and to their slowness in improving their methods and in demanding better equipment. As soon as we open our eyes to the opportunities about us for the elimination of drudgery from laundry work, and as soon as we make use of these opportunities, we shall realize the essential dignity of the process whereby our clothes are made clean and healthful, and we shall feel, as we should, that "wash day" is no longer a despised day, but a day of renewal—the fruit of which is infinitely worth while.

Shelter, food, and clothing claim equal shares in the economics of the family life. It is the purpose of this book to discuss only the last of these three—clothing in its larger sense, including all fabrics used in the household. The economics of fabrics, of course, presents two costs, the purchasing cost and the renewal cost. We shall not attempt to consider the first except as it definitely bears upon our present discussion. Our study in the following pages, then, is the renewal or renovation of fabrics by cleansing methods. Renovation is economy in so far as its cost does not exceed the original cost of the fabrics. Fabrics may justify a large first cost if they are of material that can be cleaned or dyed or that is worth recutting. To pay for quality under such conditions justifies the purchase. Fabrics stained are unsightly, making the garment look old or untidy. Therefore, renovation is an important process in prolonging the usefulness and beauty of fabrics.

Since successful renovation depends not only upon a knowledge of proper equipment and methods, but also upon an understanding of the nature of fabrics, we shall in this first chapter consider the kinds of fibers, their characteristics, their similarities and differences, and their reaction with cleansing agents.

Classification of Fibers:

VEGETABLE: Linen, Cotton.
ANIMAL: Wool, Silk.

Those who would do the most delicate work and undertake the unusual problems in the laundry should make at least a general study of the common textile fibers and fabrics—enough to know their special characteristics and their reactions to changes of temperature and to various chemicals, as well as the effect of mechanical action.

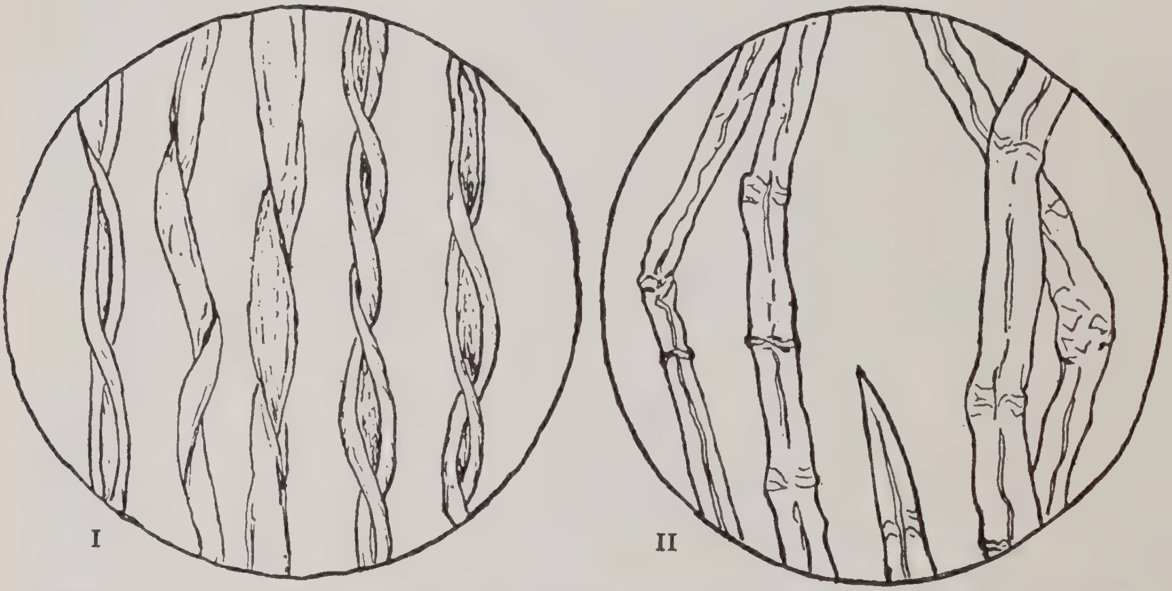


FIG. 1.—Vegetable fibers as they appear under the microscope. I is cotton fiber, showing twists; II is linen fiber, showing nodes.

Vegetable Fibers.—Cotton and linen, the vegetable fibers, are tougher than the animal fibers, and hence have greater resistance to chemicals, to friction, and to heat (Fig. 1).

The *cotton* fiber may be distinguished from linen in that it is ribbon-like and inclined to twist, while *linen* is tubular like the stem of a plant. A broken cotton fiber shows irregularly frayed or fuzzy ends, whereas a broken fiber of linen is straight or brush-like at the end. Cotton fibers vary greatly in length and in width. The long fibers are more suitable for weaving, for since they necessitate fewer joins in the intertwining process, the finished thread is thus strengthened.

Cotton may have a high gloss due to true or false mercerization. The false mercerization results from a dressing, sometimes nothing more than starch. This, of course, disappears in the water of one or two washings, leaving a dull cotton fabric, which may show a coarser weave than the purchaser supposed it to have when buying. This dressing is often used to give a dishonest finish to cheap "table linen."

A true-mercerized fiber is stronger than the raw fiber, because the chemical treatment by caustic soda has caused the fiber to change from a flat ribbon form to a cylindrical one. In addition to increased strength, this cylinder has a high gloss and reflects light.

Linen is prepared by fermenting the whole stalk of the flax plant. The long woody fibers, called "bast fibers," are finally rolled and treated to be ready for spinning. The fiber is like bamboo, with knots or nodes at irregular intervals. The linen fiber is longer than that of cotton, and for this reason makes a stronger thread.

Linen is not so flexible as cotton, so that it will break under continued heavy pressure on the folds—as is shown in the cracking of table linen on its long, regular folds. This is one reason why an ironing machine should have rolls long enough to prevent too much folding when the linen is fed into the machine.

Both cotton and linen may be treated successfully for stains if color plays no part. Concentrated acids and alkalies will in time destroy either fabric, but dilute acids and alkalies can be used to remove stains and to bleach, provided the chemical does not remain too long in the fabric, and the temperature is not too high. Chemical action is much greater if the temperature is increased; therefore, safety demands a moderate temperature, even though the action is slower. No water that is too hot to be borne comfortably by the finger should be used. All traces of chemicals must be thoroughly removed by neutralization or by dilution.

Cotton and linen can be bleached, as stated above, if one is careful to use a solution of proper strength and to neutralize and wash out the chemical. A good rule that applies generally in cleansing all fabrics may be mentioned here: *Many short applications of any reagent are better than a single long-continued one.* The washing with clear water between the applications of the chemical lessens the danger of weakening the fiber and the color.

Soaps may come in direct contact with cotton and linen fabrics; a slight rubbing will not injure them. Cotton and linen may be boiled, and may be starched and ironed with a hot iron, because the fibers are tough enough to allow this treatment.

Slight degrees of scorch may be washed from either of these fabrics, or removed by hanging the ironed garment in the sunshine. In extreme cases of scorch, wet the fabric and lay it in the sunshine.

Animal Fibers.—(Fig. 2).—Wool and silk, the animal fibers, as stated above, are sensitive to chemicals, to friction, and to heat. An understanding of their nature is essential to successful cleansing.

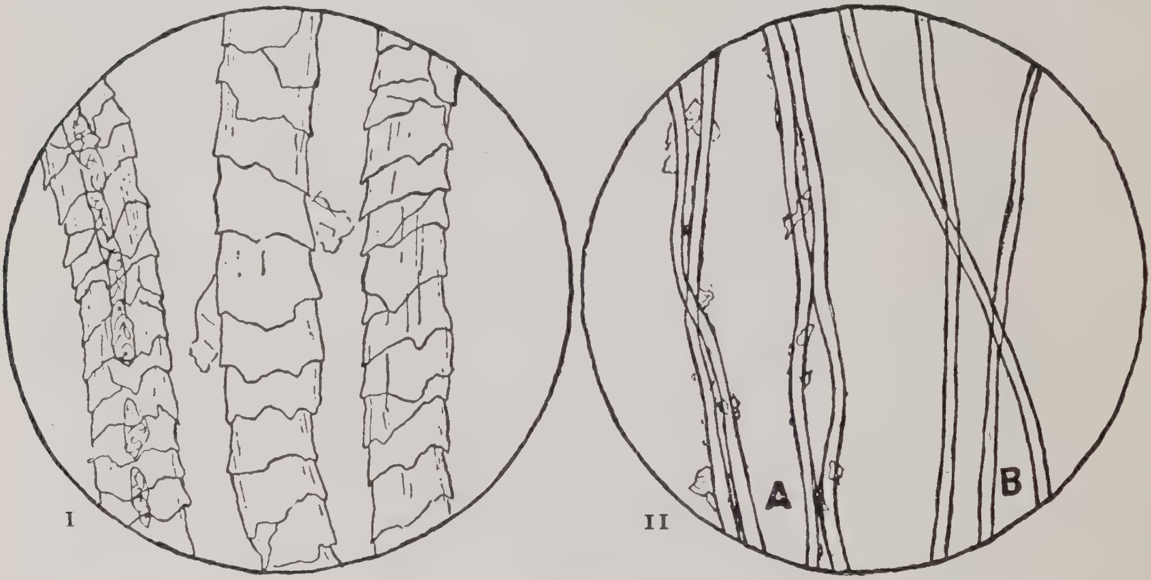


FIG. 2.—Animal fibers as they appear under the microscope. I is woolen fiber, showing serrations; II is silk, showing the continuous fiber before and after de-gumming.

Wool is a general name for the wool of sheep, also the hair of goats and camels. The quality of wool fiber depends on the animal, and on the part of the body from which the wool is taken. The longer the wool fiber, the better the fabric. The wool from the belly wall of the sheep is usually the longest.

Wool is a tubular fiber, which is covered with tiny overlapping scales. These scales, seen under the microscope, make one think of fish scales. When the fiber or cloth is wet, it expands, and these scales project their edges. If the cloth is rubbed while wet, the scales interlock, shortening the fiber, and resulting in shrinkage of the cloth. This same interlocking takes place when the wool is subjected to great heat—either of water or of the flat iron—to too strong alkali solutions of soap, or to rubbing. Such tightening of fibers is called " felting," and is quite impossible to repair. As a rule, dilute acids (half acid solution and half water) are not very injurious to wools and have less action than they do on linens and cottons.

Silk is a fine, lustrous fiber, more delicate than wool. It is produced by the silkworm, being the material with which the cocoon is spun. This cocoon substance is produced in two streams from glands in the head of the worm. Upon reaching the air these streams gelatinize together into one fiber, known as raw silk. The cocoon is boiled to remove this gelatinous covering, after which the two strands of silk may be reeled on spools. This silk has luster, is elastic, and is a strong, natural fiber. The best silk is produced by the cultivated worm.

Silk does not shrink like wool, but is easily injured by alkalies and by concentrated acids. Heat stiffens silk and finally causes it to break. This is especially seen where plaits are pressed in taffetas. The cracking is even greater should the silk be "weighted" by tin, as is often the case.

The *animal fibers* are all affected by alkalies, the effect depending on the kind, the strength, and the temperature of the solution. A continued application of most alkalies will dissolve the fiber. In the case of either silk or wool the white fibers are yellowed by alkali. Strong soda, potash, or chloride of lime will disintegrate them.

From the study of wool and silk fibers we may determine the following rules for cleaning woolen and silk fabrics:

Wash in lukewarm water—about 110° F. All waters used should be of the same temperature.

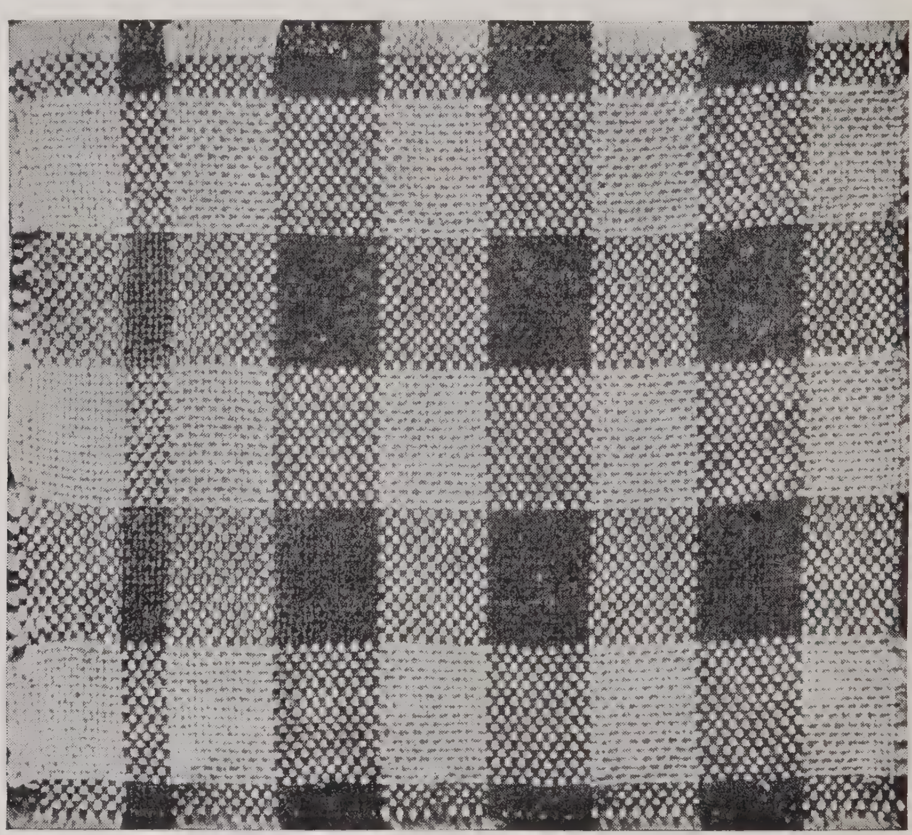
Soap which is used should be free from excess alkali, and should be applied in solution form.

Stains may be removed if dilute acids, which do not harm either fabric, will dissolve the stain. This applies to white goods only.

Chloride of lime bleach cannot be used with either fabric. Borax and ammonia may be used with either, as they are both such mild alkalies that they do little or no harm—in fact, they often make the washing easier, as in cases where hard water must be used they soften the water.

Irons should be warm rather than hot, and the fabric should be protected from the iron by cheese-cloth to prevent scorching and glazing.

Mixed Fabrics and Adulterations.—MIXED FABRICS (Fig. 3) are combinations of two fibers, which may or may not be capable of being treated as one. In attempting to clean a gown which is made of two fibers, it is always safer to consider the fiber that is the more delicate, and wash according to the rule for that fabric. For instance, a garment of silk and cotton should be considered as all silk. Silk and wool is an easy combination to handle as the same treatment suits both. Cotton and wool, even though the cotton might look better starched, must be finished as wool; moreover, wool shrinks much more than does cotton, therefore any garment made of the two fibers will have to be protected from any treatment that wool will not withstand. It would be wise to take into account these facts concerning the susceptibility of fibers when a garment is being designed; for, while we cannot control the manufacturing of mixed fabrics, we can avoid trouble by not combining two fabrics of unlike characteristics, such as wool trimming on a linen dress or *vice versa*.



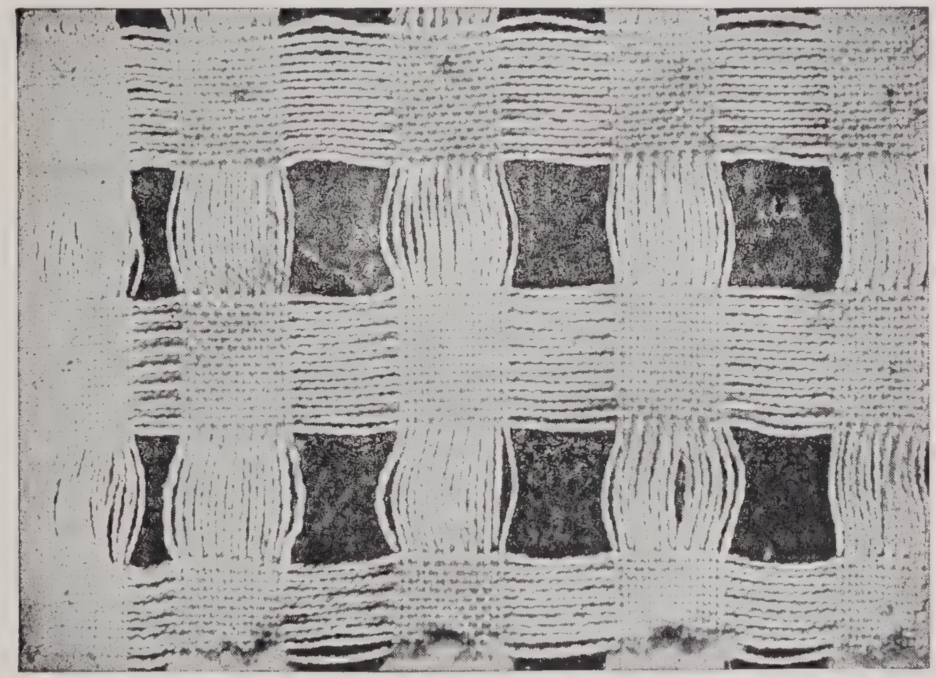
Courtesy of the Mellon Institute, Pittsburgh, Pa.

FIG. 3.—Wool and cotton mixture. The dark portion is the wool and the light the cotton.

ADULTERATIONS, that is, substitution of a cheaper fiber for a more expensive one, are present in fabrics more often than may be supposed. Much of the false construction of fabrics is so well done that it is almost impossible for the buyer to make a distinction at the counter. Special physical or chemical tests are necessary to prove the good or the bad.

Chemical tests for differentiation of fabrics are possible, but naturally are not possible for the shopper unless she takes samples home to be tested for another day's shopping. In buying doilies, collars, or blankets, for example, such a test is impossible; therefore, in cases like these, the choice must be made from experience or by trusting a reputable firm. Price is only a partial guide, and cannot always be trusted.

ARTIFICIAL SILK is a cellulose material which is much used to produce a cheaper-priced silk. The Mellon Institute of Research, in Pittsburgh, tells that "there are two types of artificial silk on the market: the better known is made from cellulose-hydrate, commonly called viscose; the other type is manufactured from cellulose-acetate, and sold under the trade name of 'Lustron.'" The practical test of an artificial silk is its extreme luster.



Courtesy of the Mellon Institute.

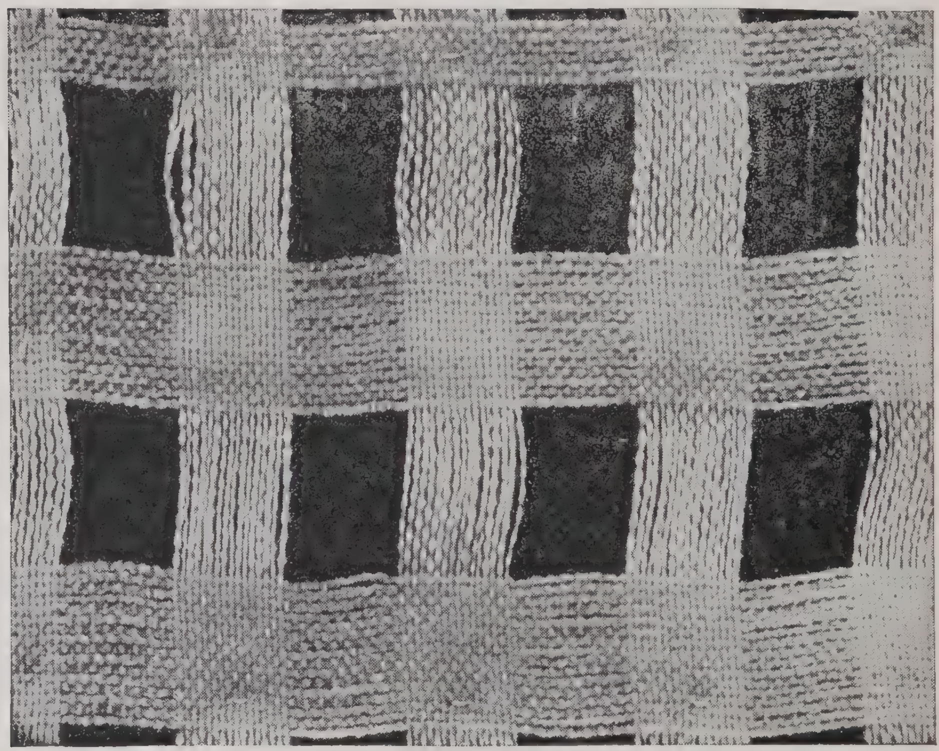
FIG. 4.—Cotton that has survived treatment with caustic soda. A piece of the fabric pictured in Fig. 3 was boiled in a 5 per cent. solution of caustic soda for five minutes. This treatment dissolved the wool and left the cotton as it appears in the above photograph.

Chemical Tests.—*Linen vs. Cotton.* Fray the sample so as to produce a fringe of warp and woof. Immerse this fringe in a concentrated solution of sulphuric acid (H_2SO_4) for one minute. Wash quickly in cold water. The fringe of linen will remain, the cotton will have "dissolved."

Wool or Silk vs. Cotton or Linen. (1) Boil a small piece of fabric for five minutes in a five per cent solution of caustic soda ($NaOH$). Wool or silk will be entirely dissolved, whereas cotton or linen will remain (Fig. 4).

Wool or Silk vs. Cotton or Linen. (2) Wet the piece of fabric in a two per cent. solution of sulphuric acid (H_2SO_4), then dry for one hour. By this treatment the silk or wool will remain, the cotton or linen will be weakened or "dissolved" (Fig. 5).

True Silk vs. Artificial Silk. Burn the fiber to be tested. The odor of burning feathers indicates real silk, while artificial silk is shown by the odor of burning wood. Real silk, when burned, gives off fumes which are alkaline in reaction when tested with litmus paper; burning artificial silk, on the other hand, produces an acid reaction with litmus. This test will have to be done by burning the fabric in a test tube, and holding the litmus paper in the fumes.



Courtesy of the Mellon Institute.

FIG. 5.—Wool that has survived treatment with sulphuric acid. A piece of the fabric pictured in Fig. 3 was dipped in a 2 per cent. solution of sulphuric acid and dried for one hour at 212 degrees Fahrenheit. It was then rubbed between the palms of the hands. The cotton was charred by the action of the acid at 212 degrees Fahrenheit and was removed by the rubbing.

Fabric Weaves.—The strongest fabrics are woven with equal amounts of warp and woof (Fig. 6)—the regular weave of under-one, over-one—with all threads equal in size and twist and made of the longest fibers. Poor fabrics are not necessarily mixed or false, but may result from many irregularities in fiber or construction which cause the garment to weaken.

Varieties of weave are used to produce special patterns in the fabric. These may be pretty, but the buyer must watch lest weakening of the fabric be caused by too long stretches or "throws" of the woof or by too few warp threads. Knots in fibers are likely to be cut in the finishing process; or, if not, then they very often loosen or break in the washing process. The severing of these knots, no matter how caused, produces weak spots, which will soon grow into small holes. False material, introduced to improve the appearance of the fabric, may disappear in the washing, thereby reducing the strength of the fabric.

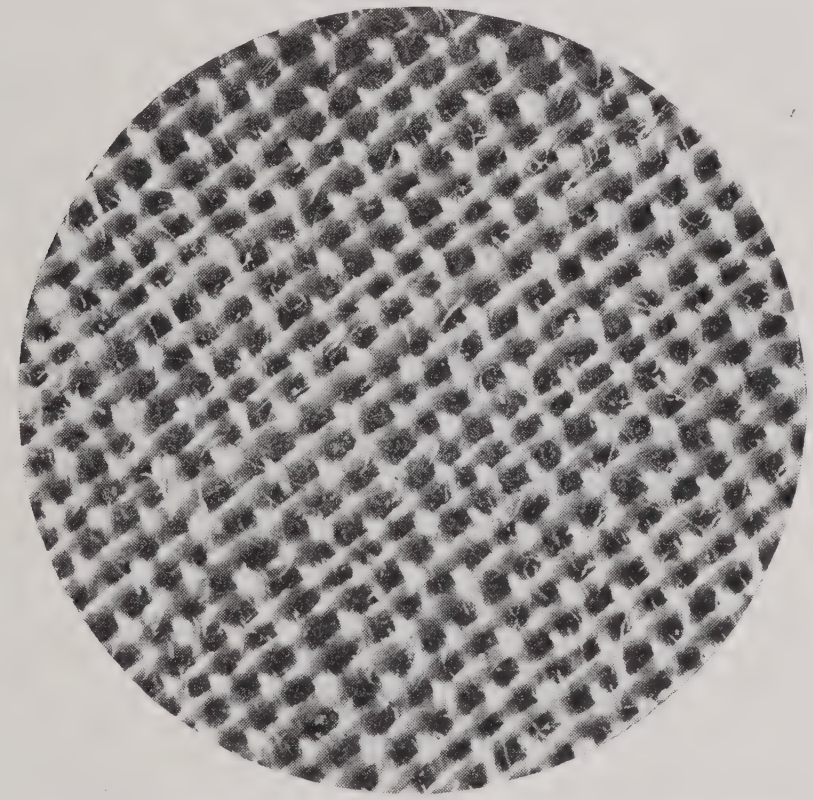


Fig. 6.—Fabric woven with warp and woof threads of equal strength, making a long-wearing material.

One of the best illustrations of poor fabric appears in the laundering of Turkish towels and wash cloths (Fig. 7). The looped thread which makes the characteristic Turkish weave should be set into a tight, well-woven background warp. If the warp is loosely set, as it is in many of the cheaper towels on the market, there is

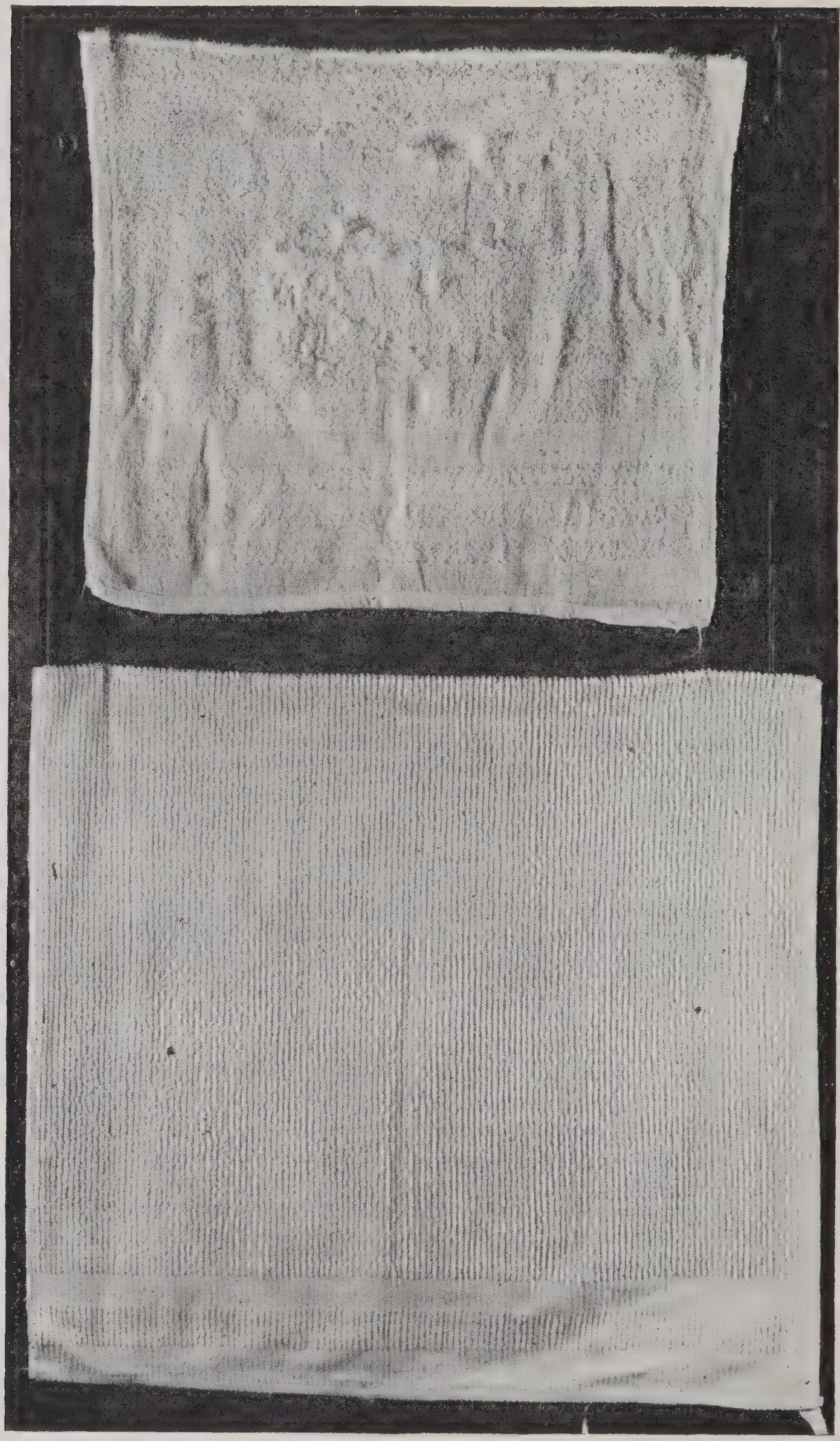


Fig. 7.—Comparison of wear.

nothing to prevent the loop from becoming loosened; it is then easily raveled out into long, useless strings, and the towel is ruined.

* * * * * * *

The facts brought out in this chapter are not offered as an intensive study of the characteristics of the various fibers. But it is hoped that they will convince the buyer—and the seamstress as well—of the necessity of a study of fabrics, patterns, and trimmings. All of these points, and others, are of great value to the owner of the garment, and also to the laundress. The buttons that are "glued" to the shanks; the poor quality hook and eye; the pressed accordion plaits that are not stitched; the use on washable gowns of trimmings that will not wash—of such items as these is made a large part of our washday troubles. The wise housewife will study carefully this question of fabrics, with a view to simplifying her laundry problems, reducing the time required to do the work, and effecting definite savings in effort and money.

Questions

1. List and classify some of the everyday household fabrics and by this classification tabulate rules for washing.
2. How could cotton be distinguished from linen?
3. By what means can you prove the presence of dressing in a fabric?
4. What test would prove that all starch dressing has been removed?
5. Given both groups of fibers, how would you present to a class simple tests proving the scientific possibility of removing stains needing chemical removal?
6. What purchasing rules for textile fibers are practical for a housewife?
7. Problem: Establish in working order a series of tests to be used to prove the economic value of one piece of fabric compared with another.

CHAPTER II

METHODS OF CLEANSING

We now realize the need of knowing the character of the fabric we are to clean. Having determined that, the next thing to ascertain is the character of the soil or stain (Fig. 8). Soil is any material foreign to the fabric in its pure or fresh state.

Types of Soil:

A. Organic:
  I. Animal. Stains from
    1. Blood
    2. Body (perspiration, oily secretion, body excretions, dead skin)
    3. Egg
    4. Fats
    5. Meat and its products
    6. Milk and its products
  II. Vegetable. Stains from
    1. Fruits
    2. Grass
    3. Mildew
    4. Oils
    5. Vegetables
B. Inorganic:
  Stains from
    1. Acids
    2. Alkalies
    3. Dust
    4. Dye
    5. Ink
    6. Medicine
    7. Minerals
    8. Mud
    9. Paint
    10. Paraffin
    11. Tumeric
    12. Wagon grease, machine oil

Many stains are soluble in water, and hence will wash out by the regular laundry process, whether in the washtub or in the washing machine. Because soaps, which are usually used for washing, set some of the stains, it is wise always to try to remove an unknown stain by clear, cold water. Never use hot water on an unknown stain, because the stain may be of some substance which is especially affected by heat. To try to remove an albumen stain, like the white of an egg, with hot water is only to set the albumen, or to cook it. Grease stains treated with hot water are likely to darken, because the heat changes the fat into fatty acids which are of themselves dark and produce such a stain as will require a special process for removal.

Stains are divided into the two general groups, organic and

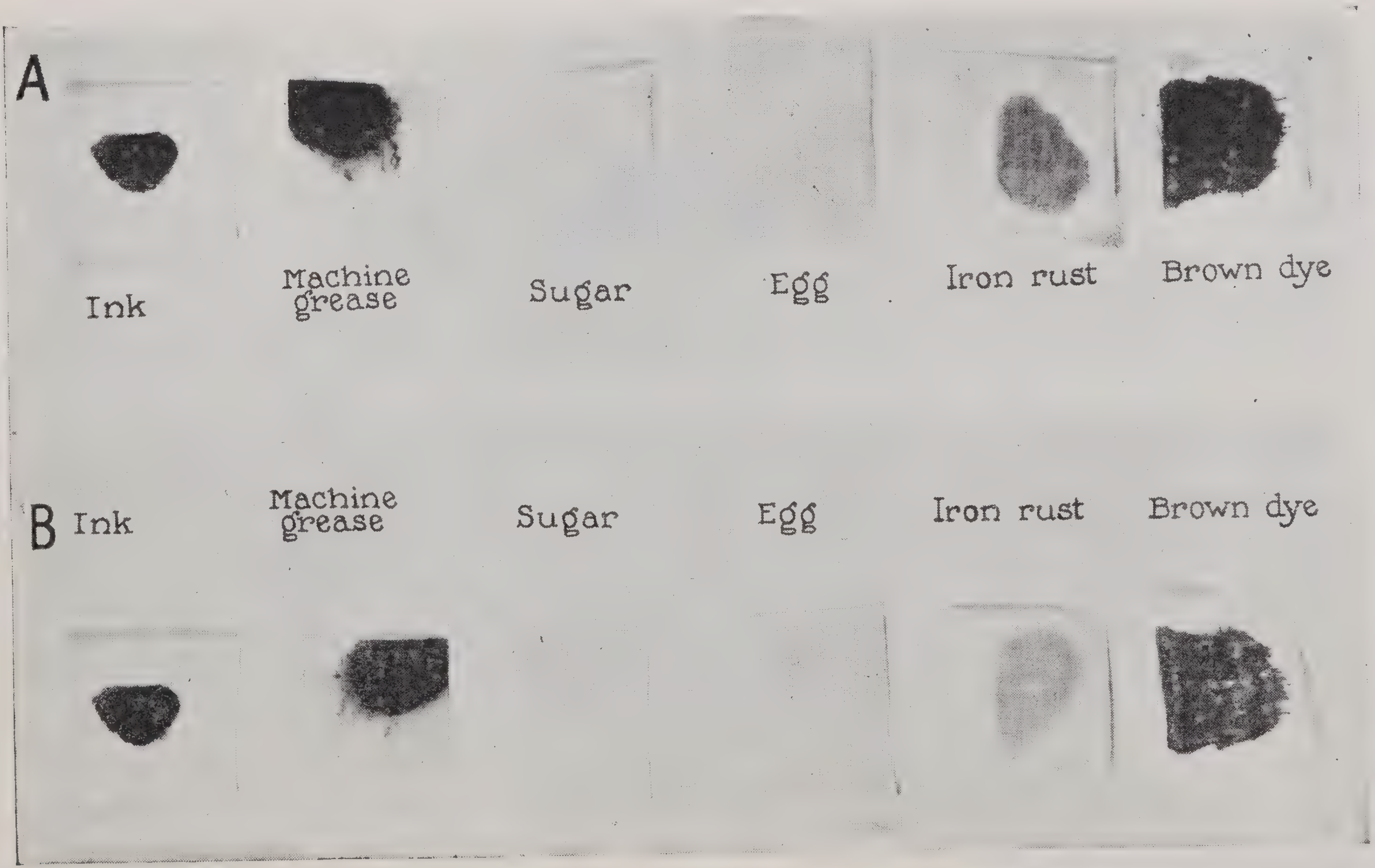


FIG. 8.—Comparative study of the penetrability of various stains on the same fabric. A shows the right side, B the wrong side. This microphotograph, together with Figs. 9-18, forms a detailed study of the effect that stains have on a fabric, in this case good quality cambric. In each case the stain is a spot which covers only part of the fabric, leaving a clean portion for purposes of comparison.

inorganic. The organic stains, in addition to blood and body stains, include food stains of various kinds, while the inorganic stains include the results of mixtures wherein dye, medicine, or mineral oil plays a part. The food stains are albumen or protein stains, fat stains and sugar stains (Fig. 9). All albumen stains are soluble in cold water. Sugar stains dissolve in cold water, and fat stains will dissolve in cold water, if a little soap is used to convert the grease into soap suds. This, then, leads to the statement, which it would be well for the worker to keep in mind in removing unknown stains—*when in doubt, use cold water.* Cold water does not harm any fabric, and may do wonders. If a water stain is left, as there may be in the case of a few fabrics which are sensitive to water, this stain is usually removed by steaming. (See page 42.)

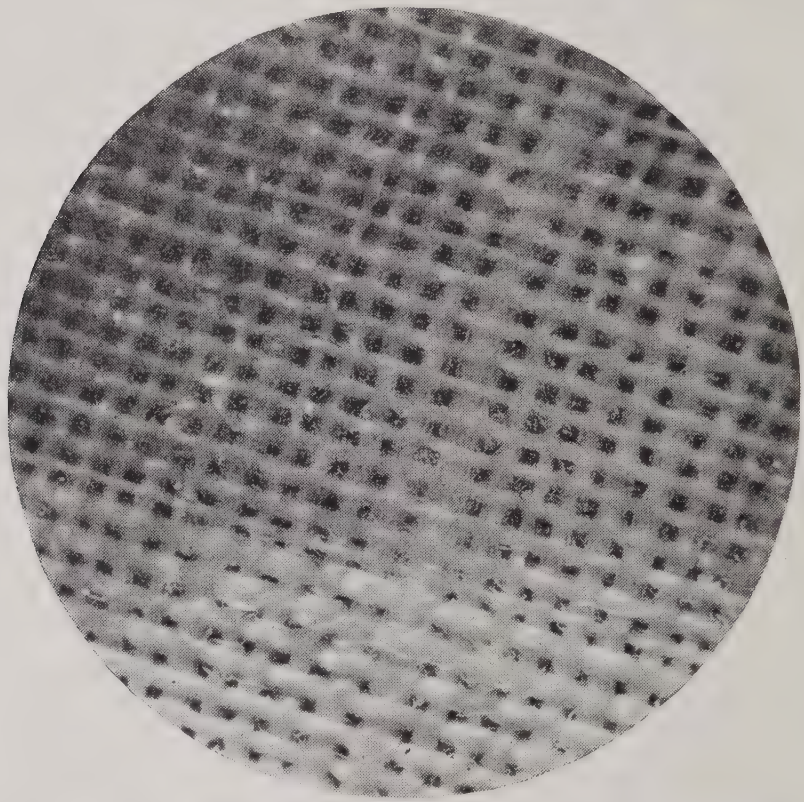


Fig. 9.—Sugar solution forms a crystalline stain on the surface. Note reflection of light from the crystals in the stained portion of the fabric.

To differentiate between the three groups of food stains, there are a few suggestions that may be helpful. Albumen is almost always a surface stain, remaining in a skin-like form on one side of the fabric rather than on both sides (Fig. 10). This skin often will peel off from the fabric, leaving it almost free from stain. Sugar stains usually crystallize on the fabric in a rough, gritty form, and make the fabric stiff and glazed. If rubbed, the stain material will crumble like sugar. Fat penetrates the fiber to such a degree that even a small portion spreads quickly beyond the starting point of the stain. It makes the fabric translucent, and after a short time there is a slight odor of the fat itself, or of rancidity, which has been caused through exposure (Figs. 11-14). By unknown combinations of the various foods, queer-looking, unusual stains are produced, and it is these stains especially that should always be treated with cold water first, before attempting anything else.

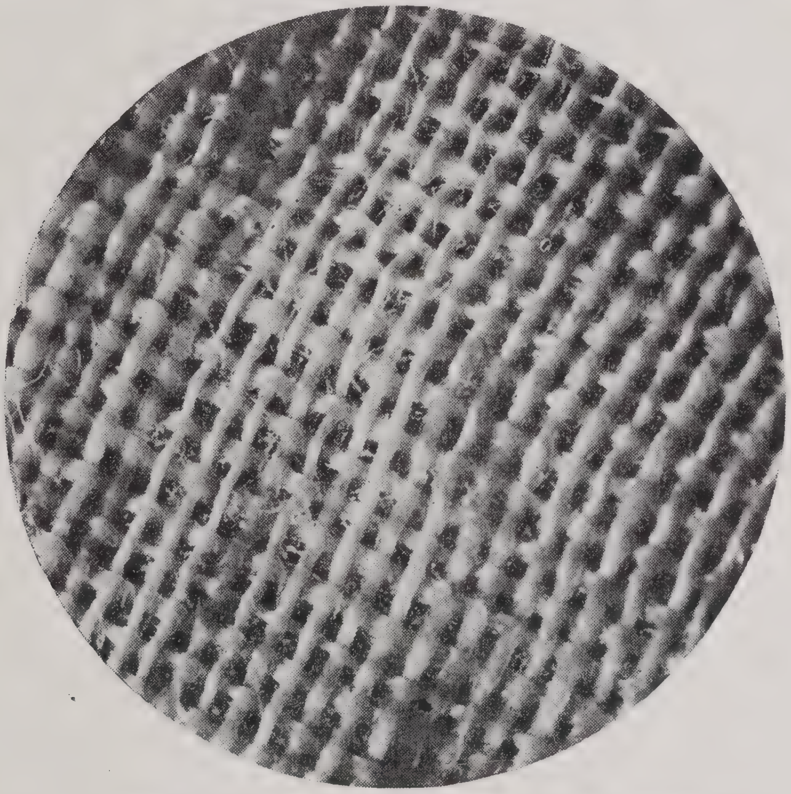


FIG. 10.—Egg white stiffens the fabric, clouds it, and forms a skin on one side.

The more difficult stains are like the chemical "unknowns." They require the most knowledge on the part of the worker, both as to the stain and as to the reaction of the stain remover on the fabric. If color is present, the greatest care must be used to prevent its loss. Many of these "unknown" stains are made by medicines, dyes, and other such manufactured materials, of which the composition is more or less unknown and complex. For example, ink may give an acid or an alkaline reaction, according to its chemical composition, which many times is held as a secret by the manufacturer. It is with these stains that chemical and textile knowledge reaps the greatest reward, and with which patience is the crowning factor.

Most of these stains are not soluble in water, but require a chemical solvent. which produces a new compound by uniting with the original element of the stain, so that it is the new substance which is really washed out. Iron is a good illustration of such a stain. Iron rust is really an iron oxide, which is insoluble in either hot or cold water. If hydrochloric acid is applied to the iron rust stain, the insoluble oxide is converted into a soluble chloride, which washes out with the water used as a rinse after the application of the chemical. This knowledge at the outset seems to prove to the special professional worker the necessity and the right of using chemicals in the laundry.

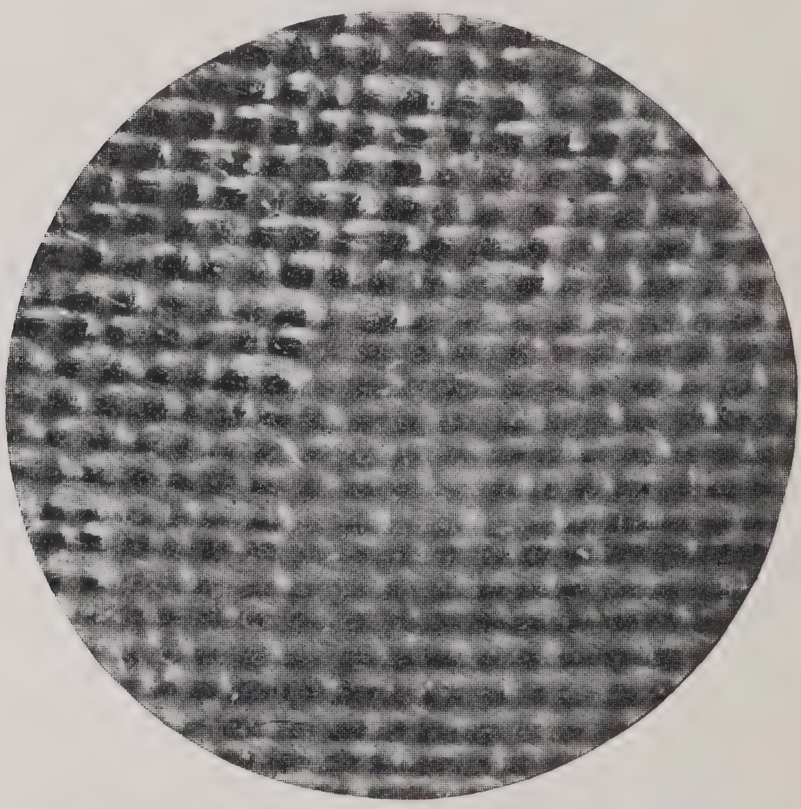


Fig. 11.—Egg yolk makes a stain, only part of which penetrates the fabric. Note that the fat globules have partially filled the pores of the fabric, while the remainder of the yolk forms a cloudy coating on the surface. Compare with Fig. 13, oil stain.

Mildew is an organic, vegetable stain of a fungous nature. It attacks the cloth first on the surface, and if found early—within a very few hours—may be washed off easily. In later stages it may be bleached out by Javelle water, by a solution of chloride of lime, or by potassium permanganate and oxalic acid. At a still later stage it will be found impossible to remove because it has attacked the fiber to the point of destruction, the action being like that of mold on bread or cheese. To remove the stain is to remove the fabric.

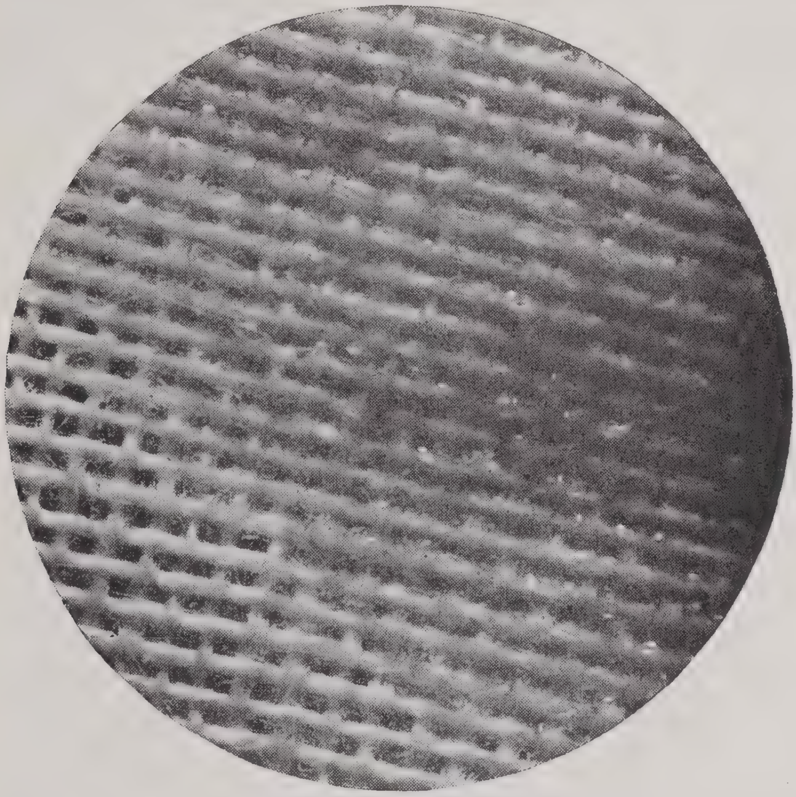


Fig. 12.—Whole egg beaten. White forms cloudy coating, yolk penetrates showing fat globules.

Methods of Removal.—The fabrics and the soil having been classified, the methods of stain removal may be classified under:

1. Solvents
2. Absorbents
3. Detergents
4. Bleaches

Solvents.—The discussion on soil shows us that water is the main solvent agent to be used in cleansing clothes. Soap increases the cleansing power of water by forming suds with the water. These suds float away the particles of dirt. When grease is present, the suds carry it in emulsion form on the water. Acids and alkalies may be solvents because they convert the solid substance into a liquid, or the insoluble into the soluble state, with the result that the stain passes out with the wash water which is used to rinse out the chemical. The other solvents are especially grease solvents.

If used, they should be used by the same method as for absorbents: that is, by having a cloth under the stain quickly to absorb the grease, which has been liquefied by the grease solvent. These other solvents are:

1. Benzine
2. Chloroform
3. Ether
4. Oxalic acid
5. Hydrochloric acid

Absorbents.—These are the most efficient agents for grease and are most often used when the fabric is not to be wet, either because it is desired to retain the original gloss or because water is injurious to its color and its finish. Absorbents act like blotting paper, and must be used as such, the worker bearing in mind that as fast as they absorb oil and become saturated, so fast must a new absorbent be used. When grease is to be removed, it must first be liquefied by a solvent (one of the above) or by heat, and so made ready to be absorbed. Apply the absorbent to both sides, so that the absorption may be rapid enough to prevent the liquid, which is now carrying the dissolved grease, from spreading into the fabric. To use powdered absorbents for egg, custard, or albuminous stains

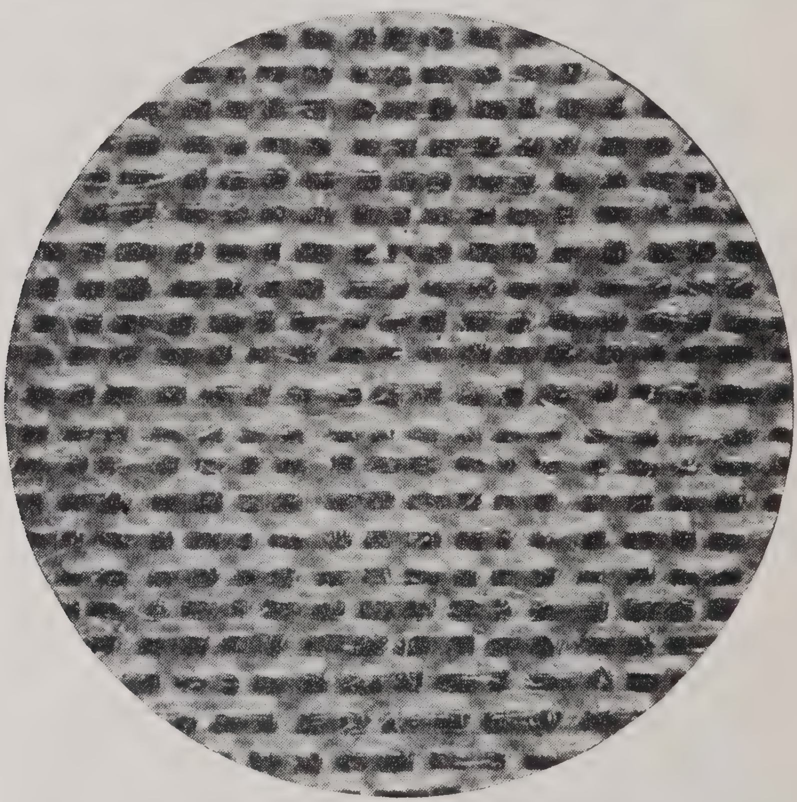


Fig. 13.—Oil does not form in globules as does solid fat, but penetrates the fiber itself. Note the reflection of light from the oil-permeated fibers.

on taffetas or heavy glazed material is futile, and is most likely to make a white spot which is almost impossible to remove. The white spot is due to the dry powders filling the pores of the fabrics. A list of absorbents follows:

1. White blotting paper
2. Unglazed paper
3. Unglazed cloth
4. Cloth of same material as garment
5. Dry starch
6. Fuller's earth
7. Meals
8. Magnesia

Detergents.—These are in a way solvents, because most prepared detergents contain some grease solvents, such as ether or gasoline. A detergent usually is a soap solution, combined with some grease dissolving agent. Its action is rapid, so that the garment is quickly cleansed. Do not use a detergent unless water can be used on the fabric. It is of great service in "spotting" (technical term for removing spots) heavy suitings. For recipe, see page 161.

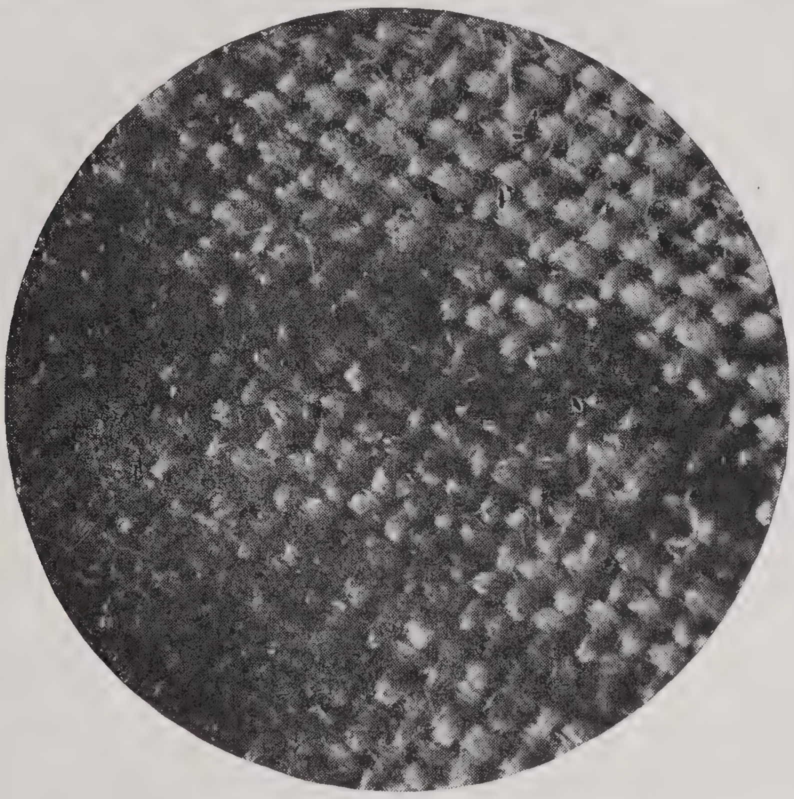


Fig. 14.—Machine oil presents two elements—oil and carbon. The oil penetrates the fiber, while the carbon remains on the surface. Fig. 13 shows how the oil spreads to a greater extent than does the carbon.

Any cleansing solution containing ether or chloroform may fade color, as some dyes dissolve in their presence. It is wise, therefore, to test the effect of a detergent on a sample of the goods or on a hidden part of the garment, as a seam. Diluting the solution may be all that is necessary to prevent fading. In addition, the water used with the detergent may leave a water spot or ring; this is easily removed by steam (page 42).

To use detergent: Apply cleansing fluid with a soft cloth or a clean sponge; or, preferably, use a piece of the same goods as that to be cleaned. If the fabric from which the stain is to be taken is a dark material, it is wise to use an absorbing material of as near the same color and texture as possible. This often prevents a white spot from forming; many times the dye of the rubbing cloth shares its color sufficiently to replace the loss from fading. Keep in mind the fact that the detergent cleans by dissolving, consequently the dirt is passing to the absorbing material underneath. Therefore, remember this—that the under or absorbing pad must be changed very frequently.

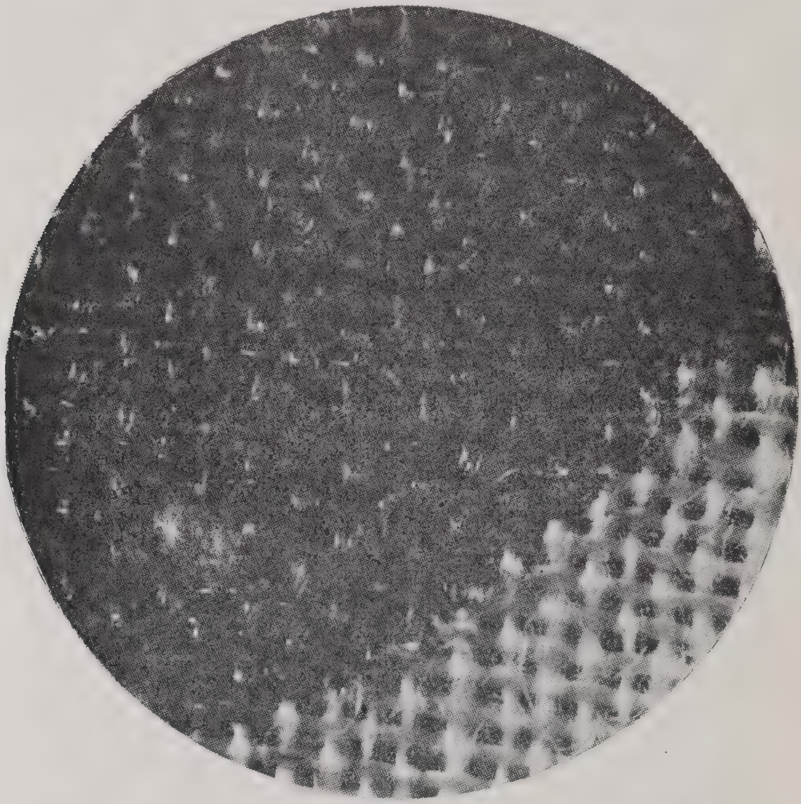


Fig. 15.—Ink acts as a dye on cotton. Compare with Fig. 16.

Bleaches.—Such agents may be called the heroic cleaners, and for that reason are accepted and used only as the last alternative. Bleaching by other than nature's processes, dew and sunlight, is to a certain degree detrimental to the fabric. Bleaches, whether used on stained white goods, or on a colored fabric, remove color by oxidation; therefore, they should be considered only as agents to renew white clothing or to reduce a faded fabric to white. Most effective bleaches are oxygen bearers; this oxygen, in the presence of heat or moisture, is set free to do its work by decolorizing.

Bleaching should always be left to the last, as at no time is it justifiable to use strong chemicals when sunlight, soap and water, or borax, might have done equally good work, even if more slowly.

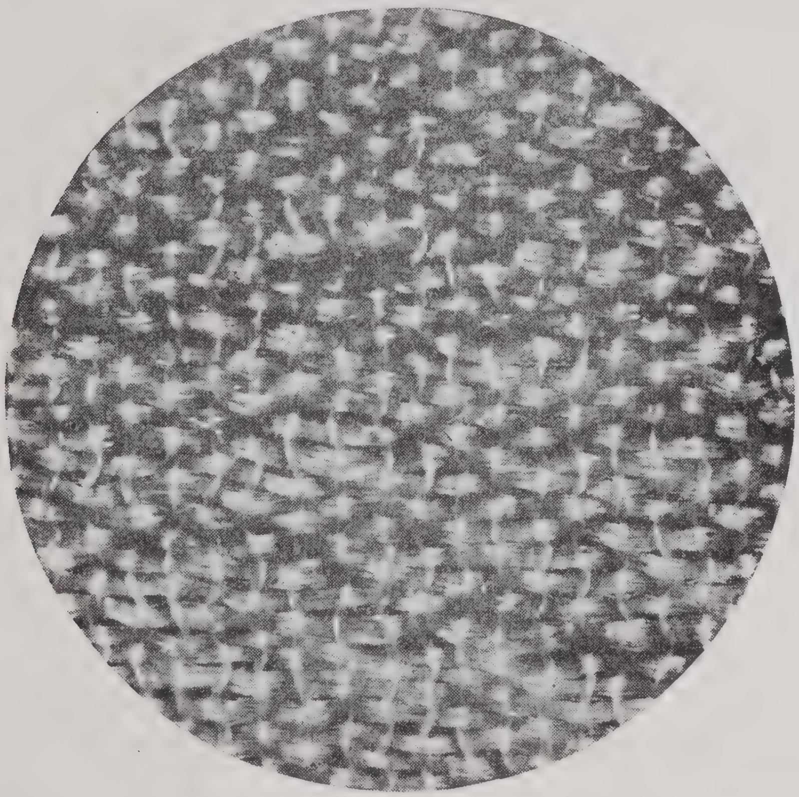


Fig. 16.—Ink stain on silk. Comparison with Fig. 15 will show that silk is apparently more resistant to ink than is cotton.

The bleaching should be done on clean, wet fiber; clean, because often the washing process will remove the stain; wet, because oxidization or bleaching is best done with moisture. Dew and frost furnish naturally the moisture for bleaching; otherwise the laundress must apply moisture by sprinkling the garment before laying it in the sun. The only time one should consider bleaching colored material is when the colored pattern has been faded to such a degree by washing that the garment would look better if all trace of color were removed. It is not advisable to bleach the whole fabric if it can be rejuvenated by tinting or washing in soap dyes to brighten it. Tinting would do less towards harming the fabric. (See Chapter

XVIII). To remove stains from colored clothes by bleaching is, of course, to risk the color. Oftentimes the loss of color is less noticeable than the spot. With quick action, the worker can sometimes remove the stain and at the same time save the color. Woolen and silk fabrics are not bleached with sun or with any strong alkali bleaches. In fact, they are likely to yellow in sunlight, while the chemical bleaches act as corrosives on the fabric.

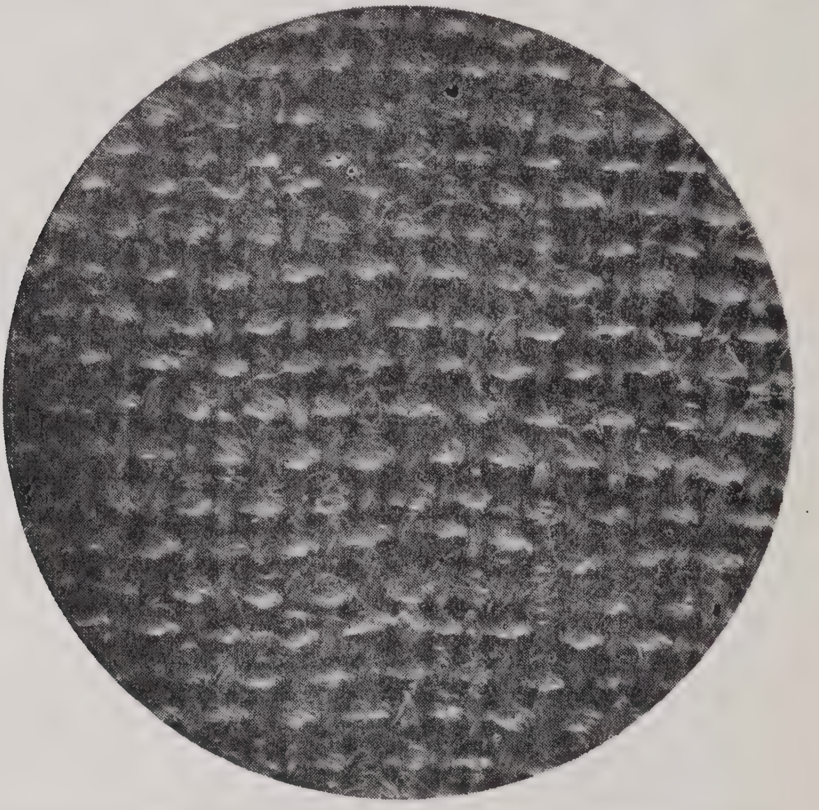


Fig. 17.—Iron rust acts like a dye. Note how it has spread from its point of first contact.

Sunshine is the simplest method of bleaching cottons and linens, also the safest. When bleaching, always have the fiber clean. To bleach with sunshine, the garment should be washed clean, then spread while wet in the sun. The sun, together with the oxygen of the water, is most effective in its work. This method requires the least knowledge and the most time, but no destruction of fiber results. Often the garments are spread in the dew. This dew takes the place of sprinkling and furnishes a more even and prolonged moisture. With either method of dampening we are dependent upon the oxygen supplied by the moisture. Freezing the garment bleaches it because the moisture remains a longer time in the fabric. Care must be used in handling or folding a frozen garment, as the fabric is likely to crack. Washing in soap suds during the bleaching process will hasten the sun's work. As stated above, wool and silk cannot be bleached by the sunlight method, as the sun causes both fabrics to sunburn.

Borax and *ammonia* are often used as mild bleaches. They may be added to the water and, if used in the final rinse, will do much to whiten the fabric. Their great power is as solvents of grease which may be holding the soil in the fabric. Either borax or ammonia is a good bleach for woolens, as neither is strong enough to dissolve the fiber.

Sulphur may be used to bleach woolens, but must be handled with great care, not only because its burning involves the danger of fire, but sulphur fumes should not be inhaled. A large barrel or box out of doors may be used as the bleach room. Sulphur bleaching indoors is not advisable. Stand a sulphur candle in a pan of water in the bottom of the barrel, suspend a number of strings from each side of the barrel, and on the stretched strings lay the clean, wet woolen garment (white, of course), and let the fumes from the burning candle pass up and through. Be sure the garment to be bleached is clean. A cover over the top will make the process more complete and save the worker. The time required depends on the degree of discoloration to be removed. To ascertain the degree to which the bleaching has advanced, instead of looking into the bleach barrel, remove the cover for a few minutes to allow the sulphur fumes to escape, and then lift the garment. Re-cover for further bleaching. After bleaching the garment, wash it to remove the sulphur odor.

Chloride of lime is the bleach most often used in the laundry. It is rarely used alone, but is combined with washing soda, the combination producing Labarraque, more commonly called Javelle. Javelle should be used as a perfectly clear liquid, and always with water. Its bleaching action, which is due to the union of chlorine with water and the consequent release of oxygen, the real bleach, is increased by heat. Therefore, it is wrong to boil clothes in bleach, because under high temperature the bleach is most destructive to cotton and linen fibers. A good bleaching temperature is 110° F. Javelle and oxalic acid make an excellent combination for the removal of very stubborn stains, but must be used carefully. Javelle must not be used for woolens and silks. (See recipe for Javelle, page 29.)

Oxalic acid is a good bleach if used in half-strength solution. Be careful to wash out every trace of acid, and then the bleach will not necessarily harm the fabric. Oxalic solution alone may be used with considerable success to remove ink from silk. If the acid is applied and quickly washed out, and the process repeated, often the worker will be rewarded by a successful removing of the ink without loss of color. (Recipe, page 30.)

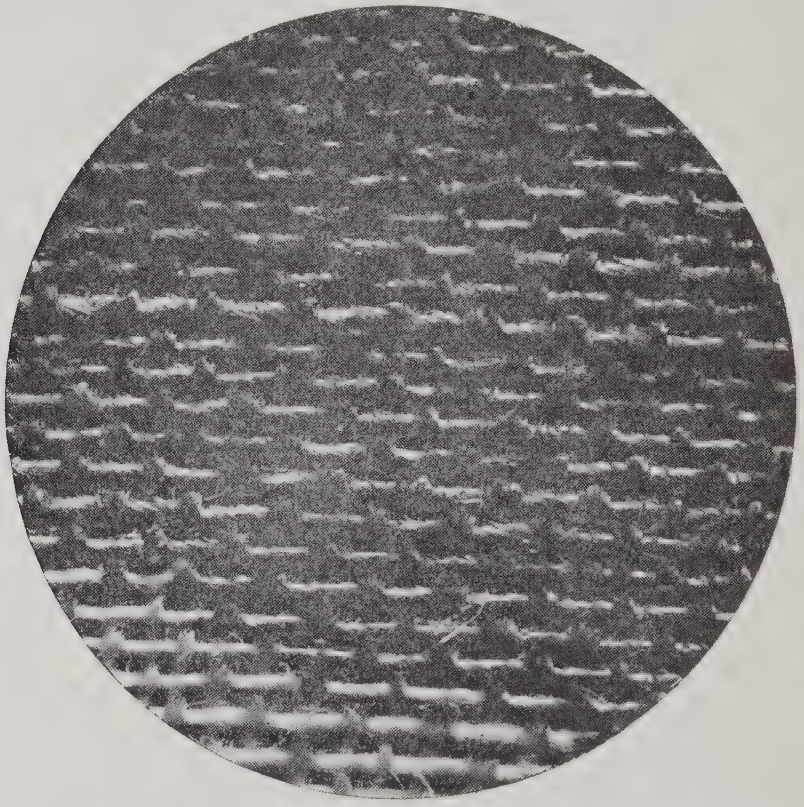


FIG. 18.—Dye penetrates the fabric. This might be a double study—from the viewpoint of stain and of dyeing—as it shows how dye penetrates a woven fabric.

Potassium permanganate is a strong oxidizing agent, hence a bleach. If used in conjunction with oxalic acid, it will remove most of the otherwise obstinate stains. It cannot be used with wools and silks, as it yellows both fabrics, acting somewhat as a dye with a slight corrosive property. Permanganate alone is a dye. The oxalic acid, following the permanganate, acts as a double bleach. Do not use potassium permanganate and oxalic acid to remove stains from colored fabrics unless the white spot resulting is less conspicuous than the stain. (Recipe, page 30.)

Hydrosulphite of soda and *hydrogen peroxide* are also oxidizing agents, the former being especially suited for silks.

Questions

1. By what general directions would you wash woolens?
2. How does this method apply to cleansing blankets in a washing machine?
3. What are the arguments pro and con concerning the use of foods as stain-removing agents?
4. What substitutes could be used in the absence of soaps, if cleansing is the only consideration?
5. Should a water ring remain from the use of detergent, how may it be removed?
6. Why does a worker often find rings or spots after using cleansing mixtures?
7. Problem: Establish some rules that could be considered standard for doing a family wash. In such a case, differentiate between a rule and a hint.

CHAPTER III

METHOD OF REMOVING STAINS

Before beginning to work on the stain, the worker must consider, and as nearly as possible decide, these questions:

What kind of fabric is stained?

What is the stain?

In both cases experience helps to answer the two questions, but often a third element is present—that is, the color of the fabric. It is wise to test the action of the reagent on a bit of the colored fabric by using a sample of the goods, some inner seam, or a part of the garment that is underneath. That test having been made, the worker or owner must decide which is the least noticeable—the stain with its color, or the loss of color which may result from the removal of the stain. Water rings need not hinder, for if they are all that remain after the stain is removed, they are usually easily and quickly removed by steam.

Removal of stains on white cottons and linens is, comparatively speaking, a known quantity; on white silks and wools it is harder and less sure, but usually worthy of trial, and often rewarded by success. On colors there is always a risk, always need of much care and deftness. The use of dilute solutions is always required. There must be very rapid work. Often it is preferable to have the stain removed, because the resultant white spot may be less noticeable than the dark stain of ink, for example. If the white spot remains, it may be retinted. This retinting can be done with water colors, perhaps after each cleaning, or with carefully mixed dyes. The dye soaps will help.

Method of Procedure.—Knowing the fabric and the stain, prepare to remove the stain by spreading the stained portion over a bowl. Moisten the stain with cold water, and then with a dropper or stirring rod apply the right reagent. Follow quickly with warm water, not hot, and keep in mind that *many short applications* are surer and safer than a long-continued use of chemicals without rinsing.

If all concentrated or full-strength chemicals are diluted by an equal quantity of water, they are strong enough to dissolve stains and need not harm the fabric. (See recipes, page 29.)

When the stain has disappeared, one of two things must be done and done well; either wash the spot which was treated and the goods surrounding it until the chemical is entirely removed, or neutralize the chemical by an opposing chemical, and then rinse. After removing stains, wash the spot with soap and water and then rinse. The soap and water will neutralize any acid that may remain, and is generally the safest method because an opposing chemical may change the color.

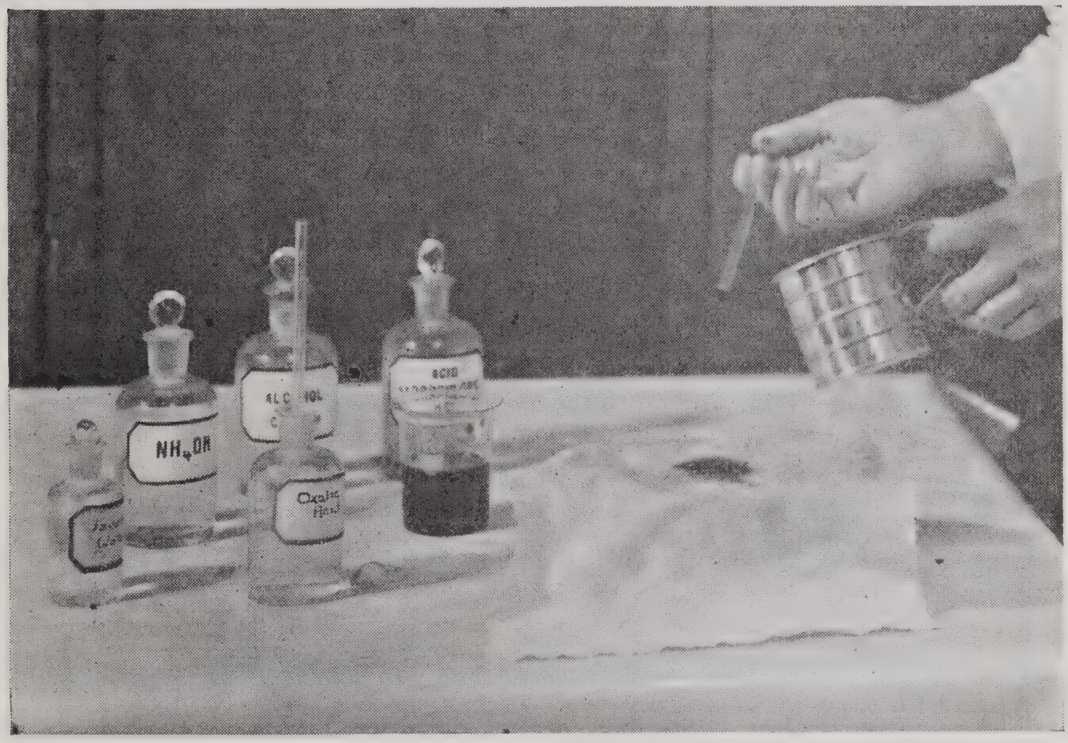


FIG. 19.—Removing difficult or unknown stain. Application of potassium permanganate.

In some cases two chemicals are needed to remove the stain; one follows the other in right rotation as prescribed in stain-removing list, but it is always wise to wash between reagents with clear, warm—not hot—water. Do not use bleaches unless as a last effort, and do not use on colors—remember that the word *bleach* means *no color.* For example, ink stains on white woolens may be removed by oxalic acid; if oxalic alone fails, use Javelle after the oxalic. The oxalic acidulates the wool and keeps the alkali bleach from its natural action of yellowing and dissolving wool. If these treatments are long continued, they will most likely result in a thinning of the wool fiber. But the Javelle could not be used on a colored woolen fabric.

The housekeeper, often afraid to use chemicals as stain removers, has formerly relied much on the household reagents taken from the kitchen supplies. The results have been varied and often-times incomplete, because the agents used have been diluted by nature or have introduced an outside element which acts only as a hindrance or produces a second stain to be taken out.

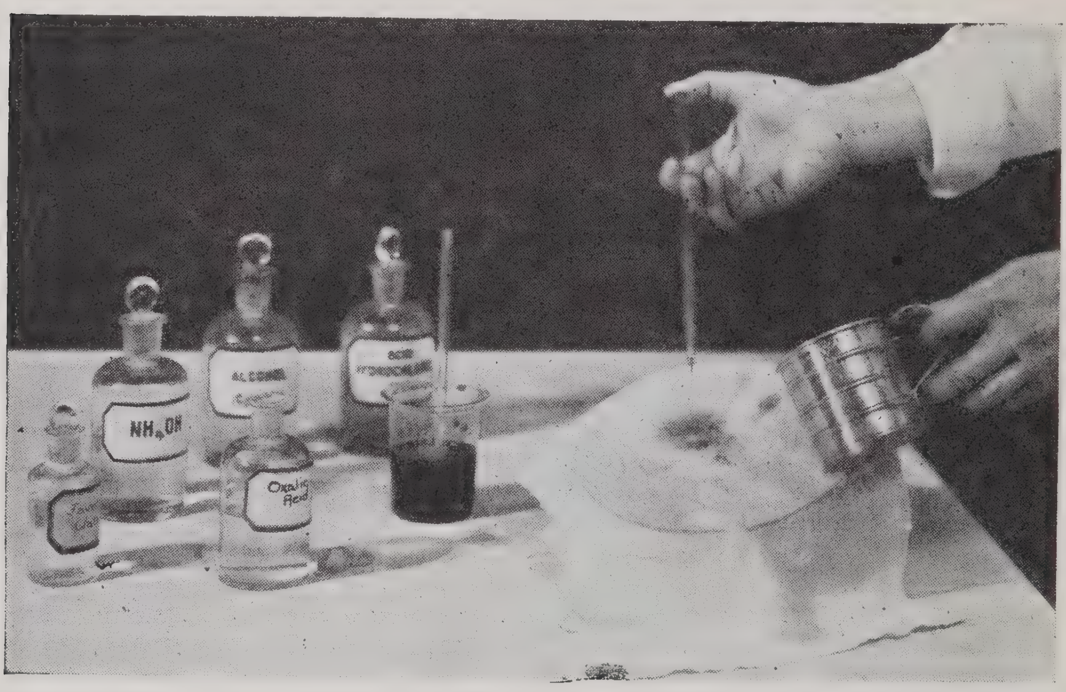


Fig. 20.—Second stage in removal of difficult or unknown stain. Application of oxalic acid.

Milk for ink stains is a good example. Milk in itself does little more than warm water would do, not working if the milk is allowed to dry. Usually the rule is to soak the garment in milk for several hours. What really happens is that the worker has waited until the milk sours, producing lactic acid, which does the work if it is done. Fat is a hindrance which is introduced with the milk agent, and a grease spot remains after the ink has gone. This must be taken out next.

Unknowingly, the housewife has been using acids, for

Sour milk gives lactic acid;
Tomato juice gives malic acid;
Sorrel }
Lemon } give citric acid;
Cream of tartar gives tartaric acid.

These chemicals in food are in very small percentages, sometimes combined with color. They are acids so that they take out color, but are so dilute as to be very slow in action. The result is that the worker has spent hours in accomplishing a result which might have been brought about with equal safety and much greater efficiency by the use of stronger, purer reagents, provided she had sufficient knowledge of their reactions to make it right to use them.

Rules That a Stain Removal Specialist Follows:

1. Know the material.
2. Know the stain.
3. Use dilute reagents.
4. Use a dropper.
5. Wash thoroughly or neutralize chemical.
6. Always use simplest reagents first.

Recipes:

JAVELLE WATER

1 lb. washing soda
1 qt. boiling water
½ lb. chloride of lime
2 qts. cold water

Put the soda into an agate pan and add the boiling water. Mix the lime with the cold water. Mix the two solutions by stirring well. Let the mixture settle and clear. Bottle the clear liquid and keep it in a dark place. Should the solution turn pink from exposure, it has not in any way been harmed. The heavy lime sediment of this mixture is an excellent disinfectant for toilets and drain pipes. The pipes should be rinsed with plenty of water after the disinfectant has had time to purify them. An old stone crock is the best vessel for storage of bleach if larger quantities are needed.

Javelle water forms a very efficient bleaching liquid for unbleached fabrics, as well as for cotton goods that have become yellow with dirt and age. To remove stains from white goods, soak the article in equal quantities of Javelle water and hot water until the stain disappears; then rinse thoroughly in several waters, and finally in dilute ammonia water. Boiling in Javelle water is a risk that should be taken only after all other sources have failed. The permanganate and oxalic acid or the Javelle and oxalic acid combination is less harmful than boiling in Javelle. Articles washed in Javelle water have a strong odor of the chloride of lime; the final washing in soap suds or in water to which ammonia has been added will help to destroy this odor. Use one tablespoon of ammonia in two quarts of water. Since Javelle removes stains and colors, it should not be used on colored goods. If articles remain too long in the Javelle water, the fiber will be weakened. If all Javelle is not washed out, the garments will be yellow as they are when washed with too much soda in the wash water, or with strong alkali soaps. The bleach used in commercial laundries is overcome finally by an acid rinse called "sour." (See pp. 108, 131.)

OXALIC ACID

1 oz. crystals	¾ cup water

Dissolve the crystals in lukewarm water. For all stain work this solution must be diluted to half strength by the addition of an equal quantity of water, as the concentrated solution would destroy the fiber.

In addition to being a stain remover and a bleach, oxalic acid is also used as a "sour" for "sour" aniline blue, and as a cleaner for copper washing machines. (See pp. 108, 130.)

POTASSIUM PERMANGANATE

1 teaspoonful permanganate crystals
1 quart water

Dissolve the crystals in water. Strain and bottle the clear liquid. Since this reagent is a dye, it must be followed by oxalic acid, which bleaches out the brown permanganate stain. First apply the permanganate to the stain, then wash it with clear water; follow with dilute oxalic acid, then rinse again with clear water (Figs. 19 and 20). These operations may be repeated as often as necessary to remove the stain, but the rinsing after each operation must not be forgotten.

Cleaning Without Water.—From fabrics not to be washed, grease spots may be removed by carbon tetrachloride, gasoline, benzine, naphtha—all of which are grease solvents, but which are inflammable—or by Fuller's earth, paper, or starch—which are absorbents, harmless but less efficient than solvents.

The *solvent* method means that the gasoline, or other agent, dissolves the grease, setting it free in the solvent, so that it may run where it will, perhaps spreading, making a "gasoline ring." Much of this can be avoided by the use of clean white blotting paper or soft white cloth under the stain when it is rubbed on the top by a cloth (preferably of the same material as the garment). As fast as either cloth is soiled, a new pad or a new rubber should be used. Rubbing these stains until they are dry also helps to prevent the gasoline ring. A second way to prevent a ring or the spreading of the cleansing agent is to moisten the rubbing cloth, then cover with a dry thickness of cloth. In this way the garment is not made so wet, and there

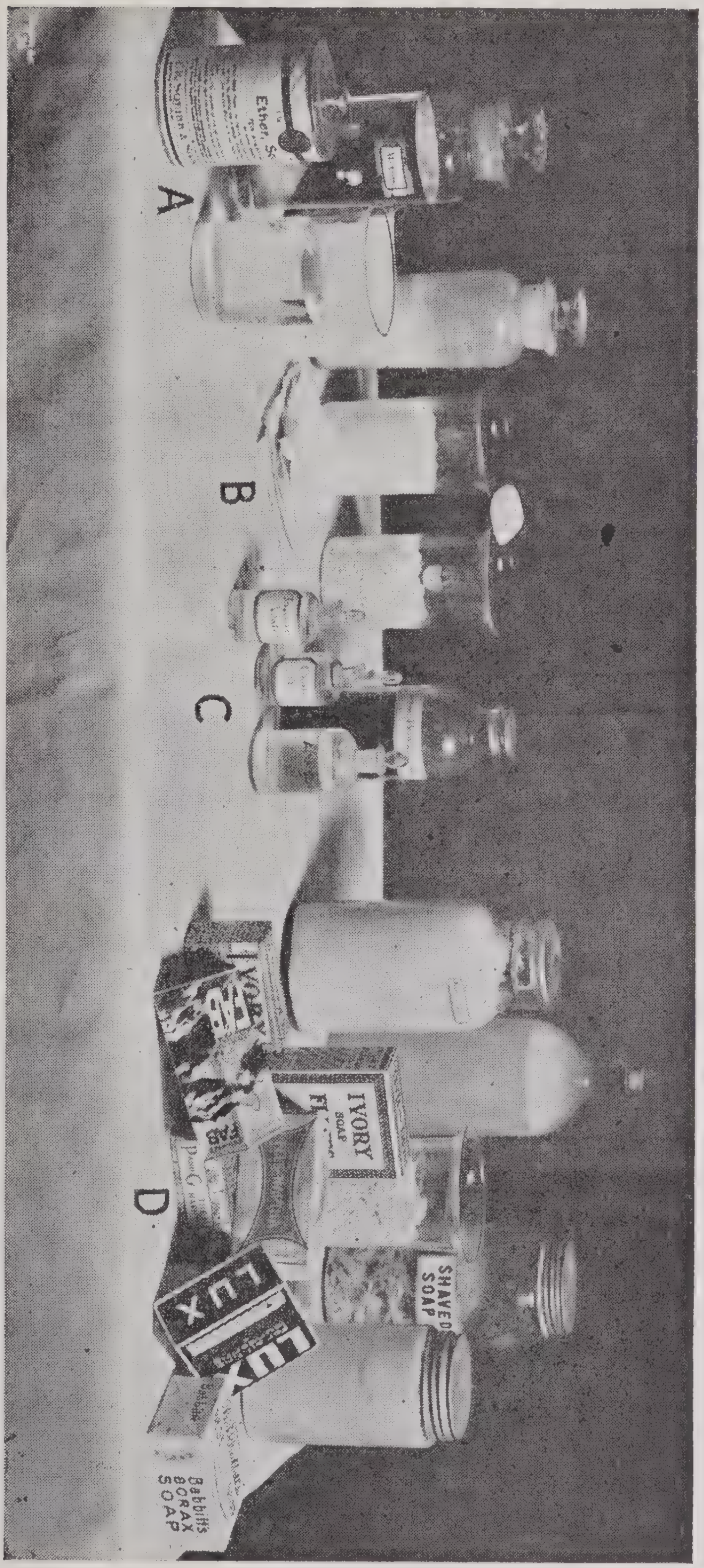


Fig. 21.—Cleansers: A, solvents; B, absorbents; C, bleaches; D, detergents.

is less chance for the fabric to lose its color. The work will take more time but will give better results. After the spot has been removed, it will be found that dipping the whole garment in gasoline or naphtha will remove traces of spots. A mixture of chloroform and ether in equal proportions makes a better cleanser than either used alone.

NOTE: Care must be taken in the use of gasoline, naphtha, ether or benzine, as all are inflammable. Do not have a flame near.

Carbon tetrachloride is a grease solvent, and is non-inflammable so that it can be used safely.

The *absorbent* method is used to best advantage when the stain is fresh, and so easily absorbed. A warm iron will liquefy the grease and aid the absorbent in its work. Do not have the iron too hot, as it will not only change the color of the fabric, but it will often decompose the grease, forming a dark spot which needs special bleaching.

Working Outfit for Stain Work:

1 dropper for each chemical used
1 cup
1 bowl
White blotting paper or cloth the color of the fabric
Soft cloth
Soft brush
Chemical

Questions

1. What practical points have you discovered in your work that might be used as "Hints in Removing Spots"?
2. Describe the appearance of a grease stain and a sugar stain; if the two were combined in one stain, how would either be different? What would be the effect on each?
3. What definite procedure would you follow in removing an unknown black stain on light blue silk?
4. When would you feel it necessary to use an "absorbent" to remove a stain?
5. List several practical "bleaches" and tell when it is safe to use each.
6. If clothes have a strong yellow cast after washing, upon what would you place the blame?
7. Problem: A white crêpe de chine waist needs to be cleaned. It is trimmed with bands of bias yellow satin, embroidered in black silk. What in listed detail is your exact method of procedure throughout the whole process?

STAIN REMOVAL

3

Character of Stain	*Reagent*	*Method of Removing*
Acid	Ammonia	Sponge with water containing a few drops of ammonia. Rub dry with piece of garment material. Too much ammonia will produce its own stain. Sometimes fumes from bottle are enough to neutralize the color from the acid.
	Sodium bicarbonate	Cover both sides of stains, moisten with water, and allow to stand until acid is neutralized, then wash with clear water.
Albumen	Cold water	Wash in cold water.
Alkali	Warm water	Wash thoroughly to dilute chemical.
	Warm water and dilute acid	Wash with warm water to which lemon juice, vinegar, or cream of tartar has been added.
Aniline dye	Javelle (for white cottons or linens)	Apply Javelle, and follow immediately with boiling water. Thorough rinsing will prevent Javelle from affecting fiber.
	Javelle and oxalic acid	Apply Javelle, follow with oxalic acid, then wash.
	Potassium permanganate and oxalic acid (for white cottons or linens)	Apply potassium permanganate, then wash with warm water; apply oxalic acid, and then wash. Any brown stain from permanganate may be taken out with oxalic acid.
Argyrol	Salt and ammonia	Apply to fresh stain.
Balsam of Peru	Kerosene	Soak in kerosene. Wash out grease stain of kerosene.
	Alcohol	Soak in alcohol.
Bichloride of mercury	See Dye	Stain not due to bichloride itself, but to presence of color added as safety precaution. Treat stain as for dye.
Blood	Warm water	Wash in warm water until stain disappears.
	Warm water and ammonia	Ammonia assists in dissolving the blood. Use a few drops to a quart of water.
	Warm water and raw starch	If heavy or new goods, as a new blanket, make a paste of raw starch and warm water. Spread on stain, and as fast as starch is discolored, make a new application.

STAIN REMOVAL—Continued

Character of Stain	*Reagent*	*Method of Removing*
Bluing	Boiling water Boiling water and acid	Wash in boiling water. Boiling will draw out the spots of blue formed from imperfect bluing. Vinegar or dilute acid will assist, if necessary. This is effective for ball or block blues.
	Javelle (for white cottons or linens)	Same as for aniline dye. A yellow cast may remain if the bluing has been an iron compound. This yellow cast or these spots may be taken out as iron rust. (See Iron Rust.)
	Potassium permanganate and oxalic acid (for white cottons or linens)	Use as for aniline dye.
Brass	Lard Olive Oil	Rub in either lard or oil, then wash in warm water and soap.
Butter	See Grease	
Butter Coloring	Ammonia	Apply ammonia for white goods until coloring may be washed out.
	Alcohol	Apply alcohol to colored fabrics.
Candle Wax	Friction and warm iron and blotting paper	Rub off all excess paraffin. Use paper each side of wax stain, then apply a warm iron—not hot.
	Permanganate and oxalic	To remove color after wax has been removed, wash in clear water and use a mild bleach (on white cottons and linens).
Chewing Gum	Gasoline Alcohol Chloroform Ether	Wash spot with any one of these, remembering that gasoline, alcohol, and ether are inflammable. The gum will rub off with the gasoline.

Chocolate or Cocoa	Cold water and soap	Usual wash method.
	Borax and cold water	Cover with borax, wash with cold water. Boiling water will remove trace of stain; use *after* treatment with borax and cold water.
Coffee	Boiling water	Spread stained part over a bowl, pour boiling water on it from a height so as to strike the stain with force.
	Borax or glycerine	Covering the spot with glycerine or borax will often assist in removing a stubborn stain.
	Javelle (for white cottons or linens)	Javelle water may be used.
	Potassium permanganate and oxalic acid (for white cottons or linens)	Use as for aniline dye.
Cream	Cold water Warm water and soap	Wash in cold water, then in warm water and soap. Remove as grease.
Dust	Yolk of egg and alcohol	Brush out loose dust. Cover the stain with a paste of yolk of egg and alcohol. Let dry, and scrape off. Warm water and a cloth will remove adhering egg.
Dye	Cold water—if fresh and not dried	Wash spot in cold water.
	Javelle (for white linens and cottons)	Use Javelle as suggested for aniline.
	Potassium permanganate and oxalic	Use as suggested for aniline.
Egg	Cold water	Wash in cold water.
Fat	See Grease	
Fly paper	Gasoline Alcohol Chloroform Ether	Wash in any one of these, remembering that gasoline, alcohol, and ether are inflammable.

STAIN REMOVAL—Continued

Character of Stain	*Reagent*	*Method of Removing*
Fruit	Boiling water	Use as for clear coffee stains.
	Borax	Borax will assist in removing stubborn stains.
	Javelle (for cottons and linens)	Use Javelle solution and boiling water in equal quantities and immerse stained portion, allowing it to soak a few minutes, then rinse thoroughly with boiling water.
	Borax and ammonia (for woolens and silks)	Borax and ammonia used instead of Javelle, which destroys these fabrics.
	Oxalic acid	Apply a few drops of oxalic. Rinse well with warm water. (Dilute oxalic acid may be used on all fabrics.)
	Potassium permanganate and oxalic (for white cottons or linens)	See Aniline Dye. This method or Javelle method best for peach stains.
Glue	Warm water	Safe method for colored goods. Warm water will dissolve glue.
	Vinegar	Apply vinegar to a white fabric if stain is old.
Grass	Cold water (without soap)	Wash a fresh stain with cold water.
	Alcohol Ether	Alcohol or ether will dissolve the green coloring matter, when material cannot be washed.
	Javelle (for white cottons or linens)	Bleach out as for aniline stain.
	Kerosene	Moisten with kerosene, let stand a short time, then wash with soap and water.
Grasshopper	Oxalic acid	Apply to stain, then wash.
Grease and oil	Warm water and soap	Wash in warm water and soap.
	Javelle (for white cottons and linens)	Remove traces of grease stains by bleaching with Javelle.

(Grease and oil, cont'd)	Potassium permanganate and oxalic acid	Old grease stains may be removed as for aniline dye.
	Detergent	Apply detergent (page 161) for stains on heavy clothing.
	Chloroform Benzine For delicate colors and fabrics	Apply these reagents with a cloth, preferably of the same material, rubbing the stain lightly until all the reagent has evaporated. (Benzine is inflammable.)
	Fuller's earth or chalk (for fresh stain)	This may be used if one fears the appearance of water rings, or a change in color. Apply the powder to the stain and let stand several hours, then brush off lightly.
Honey	Warm water	Wash in warm water.
	Javelle and oxalic acid (for white cottons or linens)	Apply Javelle, then follow with oxalic acid. Then wash.
Indelible pencil	Alcohol	Dissolve color by soaking in alcohol, then wash in soap and water.
	Lard, and soap and water	Use as for wagon grease.
Ink	Salt and lemon juice	Moisten with salt and lemon juice. Lay in the sun. Wash in soap suds. (This will remove color.)
	Salts of lemon	Apply as a powder to moistened stain. Then pour on boiling water. Rinse finally with soap suds.
	Oxalic acid or hydrochloric acid—and Javelle (for white cottons or linens)	Apply a few drops of oxalic acid, follow with a few drops of Javelle, and rinse quickly with boiling water.
	Ammonium sulphide and hydrochloric acid	Apply ammonium sulphide, wash with water, then wash with very dilute hydrochloric acid. Can be used on colors.
	Ink eradicators	Use as indicated on box. Wash finally with soap suds.
	Potassium permanganate and oxalic acid	Use as for aniline dye.
	Oxalic acid (for wool and silk)	Use without other bleach especially for wools and silks.

STAIN REMOVAL—Continued

Character of Stain	*Reagent*	*Method of Removing*
(Ink, cont'd)		
Indelible ink	Potassium permanganate and oxalic acid	Use as for aniline dye.
Mimeograph ink	Concentrated ammonia	Apply concentrated ammonia to stain. Wash and repeat until removed.
Printers' ink	Lard or grease	Rub lard or grease in well, then wash in warm water and soap.
Water-proof ink	Treat as paint	
Iodine	Warm water and soap	Wash while fresh in warm water and soap.
	Ammonia (concentrated)	Use as for mimeograph ink.
	Alcohol	Wash with alcohol.
	Starch	Apply moistened starch, brush off and repeat until stain is removed. Use this as a dry method.
Iron rust	Hydrochloric acid	Apply acid, drop by drop, until stain brightens, then rinse at once with water. Repeat until stain disappears. Care should be taken to use either borax or ammonia in rinsing water, or to wash with soap suds.
	Citric acid or cream of tartar	Apply to spot, wash with hot water. Rinse thoroughly.
	Lemon juice and salt	Sprinkle stain with salt and moisten with lemon juice; lay in the sun. This method is slower and less likely to affect material. Either method will extract color.
	Any acid food juice, rhubarb, pineapple, grapefruit	Boil in water to get acid from food, then apply to stain as any dilute acid. This method is slow.
Kerosene	Soap and water (warm)	Wash in warm water and soap.

Lampblack	Kerosene	Wet with kerosene, then wash with naphtha soap and warm water.
	Lard and soap suds	Use as for printers' ink.
Lard	See Grease	
Lead foil	Soap and water (warm)	Wash in warm water and soap.
Leather	Soap and water (warm)	Wash in warm water and soap.
	Potassium permanganate and oxalic acid (for white cottons or linens)	Use as for aniline dye.
Machine oil	Cold water and soap	Wash in cold water and soap.
	Turpentine	Rub stain with turpentine, then wash out.
Meat juice	Lukewarm water and soap	Wash in lukewarm water to remove blood, then follow with soap.
Medicine	Cold water	Wash in cold water.
	Alcohol	Soak in alcohol.
Mildew	Cold water	If the mildew is very fresh, and has not attacked the fiber, it will wash out in cold water. Only when fresh is it likely to be removed.
	Potassium permanganate and oxalic acid (cotton and linen)	Use as for aniline dye.
	Javelle (cotton and linen)	Apply Javelle, then wash with hot water.
Milk	Cold water	Wash in cold water, then follow with warm soap suds.
Mucus	Salt and water	Mucus, as found on handkerchiefs, may be soaked in salt and water, using two tablespoonfuls of salt to one quart of water. Soak for several hours. Double the amount of salt for heavy fabrics.

STAIN REMOVAL—Continued

Character of Stain	*Reagent*	*Method of Removing*
(Mucus, cont'd)	Soap and water	Wash in warm water with soap. Boiling the handkerchiefs will sterilize and whiten them.
Mucus mixed with blood	Salt and water with ammonia	Use the same method as given above. The ammonia helps to extract the blood coloring.
	Soap and water	Same as for Mucus.
Mud	Brush when dry	When dry, brush with either a brush or wool cloth.
	Soap and water	Wash in soap and water.
	Alcohol	Sponge with alcohol.
Paint	Soap and water	If paint is fresh, use at once yellow soap and water, if goods is washable.
	Gasoline Turpentine Benzine Benzol	Wash the spot in any one of these, remembering that they are inflammable. NOTE: Old stains may be most readily removed with benzol.
Paraffin	Warm iron and white blotting paper	Place blotting paper under and over the stain. Apply a warm iron, changing blotting paper after each application of heat. (See Candle Wax.)
	Benzine (with clean cloth and blotting paper)	Rub the stain with a cloth, having the blotting paper underneath to absorb.
	Kerosene	Use as benzine.
Perspiration	Soap and water (for white washable fabrics)	Wash in warm water and soap, and if cotton or linen, place in sun to dry.
	Javelle water (for cottons and linens)	Use according to directions on white goods given above.
	Ammonia (for white cottons and linens)	Wash in water to which a few drops of ammonia have been added.

(Perspiration, cont'd)	Sodium hydrosulphite (for silks and wools)	Apply a dilute solution of sodium hydrosulphite and wash in water. NOTE: To remove perspiration stains from colored goods with anything other than soap and water means, in most cases, to remove color. Re-dyeing is the final remedy. The odor may be removed by chloroform.
	Potassium permanganate and oxalic (for white cottons or linens)	Use as for aniline dye.
Pitch	Benzine Chloroform Ether Gasoline	Sponge the spot with solvent, keeping away from all fires.
Potassium permanganate	Oxalic acid	Moisten with warm water, apply oxalic acid, and then wash.
Punch	Warm water	Wash in clean, tepid water.
Salad oil	See Grease	
Shoe polish:		
Black paste	Lard or grease	Rub in well, then wash in warm water with soap.
Bronze	Hydrochloric acid and ammonia	Use acid and ammonia alternately. Wash with soap and warm water.
Tan	Oxalic acid and ammonia	Use oxalic acid and ammonia alternately. Then wash with soap and warm water.
Silver nitrate	Ammonia	Apply to stain.
Stove polish	Lard Olive oil	Use same as for brass.
Tobacco	Hydrochloric acid and ammonia	Apply dilute hydrochloric acid, follow with dilute ammonia. Sponge with soap and water.
Tumeric	Alcohol	Apply alcohol to stain.

STAIN REMOVAL—Continued

Character of Stain	*Reagent*	*Method of Removing*
Urine	Warm water and soap	Wash in warm water and soap.
	Alcohol or Dilute citric acid	Sponge with either of these reagents. The spot where the stain has been may be revived with chloroform.
Varnish	Alcohol Turpentine Benzol	Wet the stain with alcohol, turpentine, or benzol and allow it to stand a few minutes, then wet again and sponge off with a clean cloth. Continue this until stain is removed. In case the color is affected by alcohol, sponge with chloroform; but for blue material use dilute vinegar.
Vaseline	Kerosene	Wash a vaseline stain with kerosene. Soaking may aid the removal.
Vegetable	Cold water	Wash in cold water.
	Cold water and soap	If color is combined with grease, wash in cold water and soap.
Verdigris	Kerosene	Wash in kerosene; then in warm water and soap.
Wagon grease	Lard or Olive oil	Rub either oil or lard on stain, then wash with warm water and soap. It will be found of help to keep a cloth or blotter under stain while applying the oil. Change pad as soon as it discolors.
Water spots	Steam	Have a little water boiling hard in teakettle. Shake spotted garment in the jet of steam until thoroughly moist. Continue shaking until dry. Press the fabric with iron, protecting fabric with dampened cheese-cloth.
Wax	Absorbent paper and and warm iron	Scrape off all that is possible, then place blotting paper over and under spot and press with warm iron. This will soften wax and cause it to be absorbed by the paper. If there is color, as from colored candle wax, use alcohol to extract color after removing wax. Javelle may be needed to bleach the color. (See Candle wax.)
Wine	Salt and boiling water	Put thick layer of salt on stain as soon as made, then treat with boiling water as fruit stains. Boiling milk may be used in the same way, but may leave grease stain. (See Grease.)

CHAPTER IV

PREPARATION OF THE WASH

From the laundry point of view, Tuesday is a much better home laundry day than Monday, because it allows Monday for preparation. The preparation does much to economize effort and time and to lighten the work of the regular laundry day. This preparation includes collecting all soiled garments, doing the necessary mending, sorting, seeing that pockets are emptied, stains removed, and very soiled garments put to soak in cold water. It also includes the checking up on laundry supplies, and the making of a soap solution if a washing machine is used; it is sometimes possible to make this soap solution on wash day, to be ready for the next week's work; or to make it in large quantities and keep it ready for use.

Mending.—This is considered the first stage of preparation. Often a stitch before the wash saves nine after it. All mending of table linen, bureau scarfs, trimming on underwear and dresses can easily be done before the washing. A tiny break in a thread may be mended, preventing the formation of a larger hole. Mending before washing also prevents wrinkling the ironed garment. Stockings and underwear may be mended after being washed, and it is usually preferable to do so. It is a great saving, however, to catch all dropped stitches as soon as found; a careful person does not wait for the garment to be ready for the laundry, but sets it aside at once for mending.

Sorting.—An important stage in the process of preparation is careful sorting. A good sorter sorts for color, putting pinks, blues, etc., in their respective color piles; separates woolens and silks from cottons and linens; puts like garments in piles; and always puts in a pile those garments which need special care in laundering. Special care means that such garments should be washed by themselves to prevent tearing or pulling; to secure a special temperature of water; to make sure that only mild soaps are used; or to do the work quickly in order to save the color.

After sorting for colors and fabrics, another important division must be made, which is not dependent upon fabric or color—that is, sorting for such preliminary treatment as may be necessary to prevent the stains from becoming permanently established, as might happen if they came in contact with soap and water before being treated.

Sorting the wash so that like garments may be grouped and together be passed through all processes will lighten the work of the whole day. This is especially true in hanging the clothes on the line and taking them down for sprinkling. Such sorting is the primary work toward labor saving.

For Stains, see Chapter III.

Counting.—If the clothes are to be sent out, accurate counting is necessary. If goods are sent to a commercial laundry, two lists should be made, one for the laundry and one for reference. The printed laundry lists are most helpful because they are in duplicate form and they itemize the articles. This itemizing results in a detailed list that the hurried housewife is not likely to take time to make. If she makes one for the laundry, she is apt to omit making the duplicate, so necessary for the check-up on the return of the clothes. Be sure that the count is accurate, as this is the only way to avoid loss. The housekeepers' lists have formerly been so inaccurate that the laundries have tried to safeguard themselves by stating on their laundry slips that only their own sure count can be accepted. A second way to overcome this careless habit of the housewife has been to return the laundry bundle unwashed until recounted by the housewife.

Marking.—This work is also essential if the laundry work is to be done outside the home. If every garment is marked before it is put into use at all, there will be no danger of oversight when it is to be sent to the laundry.

Who Shall Mark?—There is a great deal of discussion as to whether the housewife should mark her own linen before it goes to the laundry, or whether the laundry should mark it. There really is no question that from the point of economy the housewife should do the marking. This work requires considerable time, and naturally the laundry charges for it. The question has arisen because of the housewife's ignorance of or indifference concerning the proper marking methods and places for the mark. If she is to do this work, she should, first of all, feel a sense of responsibility to see that every piece is marked, and marked in accordance with laundry standards. It will then be her share in lessening the cost of commercial laundry work.

The same question also arises in institutions. Shall the residents mark their own linen, or shall they pay a small fee to have it done in the laundry department? In this case also, as with the housewife, it is more economical if the residents do their own marking, provided they are willing to follow directions carefully, both as to how and as to where to mark. If the residents are not willing to coöperate to this extent, then it will be in the long run an economy for the laundry department to do its own marking, as there will be better control of the quality of marking ink and the place of marking.

Methods of Marking.—The various ways of marking have special advantages and disadvantages. Quick work too often controls the decision in favor of a rapid method which may not be the most desirable.

The stencil and rubber stamp probably lead the list as the most rapid methods, but, like many things which are cheaper at first cost, they are more expensive in the end. With either marking, the ink is applied as a mere surface marking, little chance being allowed for the ink to go beyond the glaze of the fabric. This is true in all cases unless the cloth has been rubbed or soaked in cold water to break the starch glaze.

The second general way of marking is much more lasting than the first, but is expensive in purchasing cost and in application or time cost. This includes the tape and thread markings. The "Cash" tapes are lasting—so much so that they may even be transferred from a worn garment to a new one. They are neat, and inexpensive to purchase, if one does not consider the time cost of sewing on the tapes. The "Bonnaz" marking is done by a chain-stitch machine. This marking is done by contract on new linen, usually in large wholesale lots of dozens of pieces. This is not such an expensive method as the tape method, but the heavy thread is like heavy embroidery, and wherever the letter is thickened, as on a down stroke of the letter, the thread weakens under the constant pressure of the ironing machine.

For dormitories in schools, or wards in hospitals, various colored threads may be used to serve as quick ways of sorting—at least for different buildings or departments.

Embroidered letters may be used for the home linen (Fig. 22), if one wishes handsomely embroidered linen. With monograms or ornamentation, one must expect to pay large sums for first cost, and a considerable amount extra for special attention in laundering. Extra time must be granted the ironer to finish this work on an embroidery pad, with much moisture and special ironing strokes. In the ironing machine the rolls must have heavy padding to allow the heavy letters to sink in deeply, in order that the letter may stand up in good form.

The most economical and at the same time most efficient way of marking is with pen and ink, or with the modern marking machine, which is like a typewriter in action and in clearness. Pen-and-ink marking has the disadvantage of being slow, but is most lasting, especially if the non-fading inks are used (Fig. 23). The commercial laundries have developed such inks to be lasting without the application of heat. They are free from the chemicals which heretofore cut through the fiber, leaving the mark, in the worn linen, like a stencil. A fine-pointed steel pen (No. 00) or a glass pen will make marking easy. To make the marking more lasting, the dressing should be washed out or the fabric rubbed soft to allow the ink to penetrate. A warm iron should follow the marking done with some inks in order to make them indelible. Read directions on the bottles. Almost all ink manufacturers put out indelible inks, and several have small, reasonably priced marking outfits, which contain ink, marking frame, and suitable

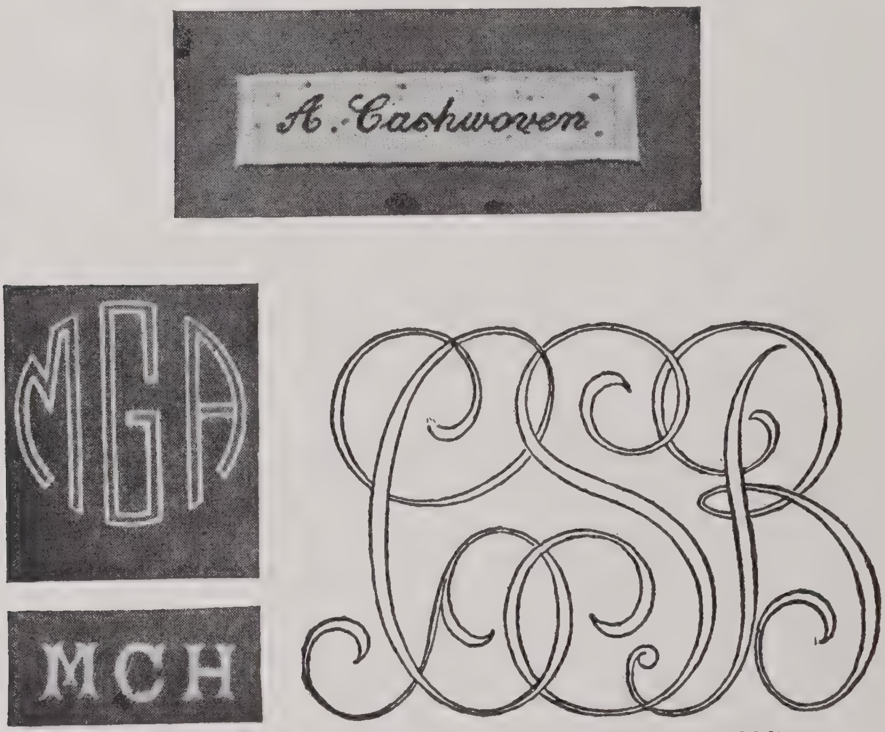


Fig. 22.—Different ways of marking personal and household linen.

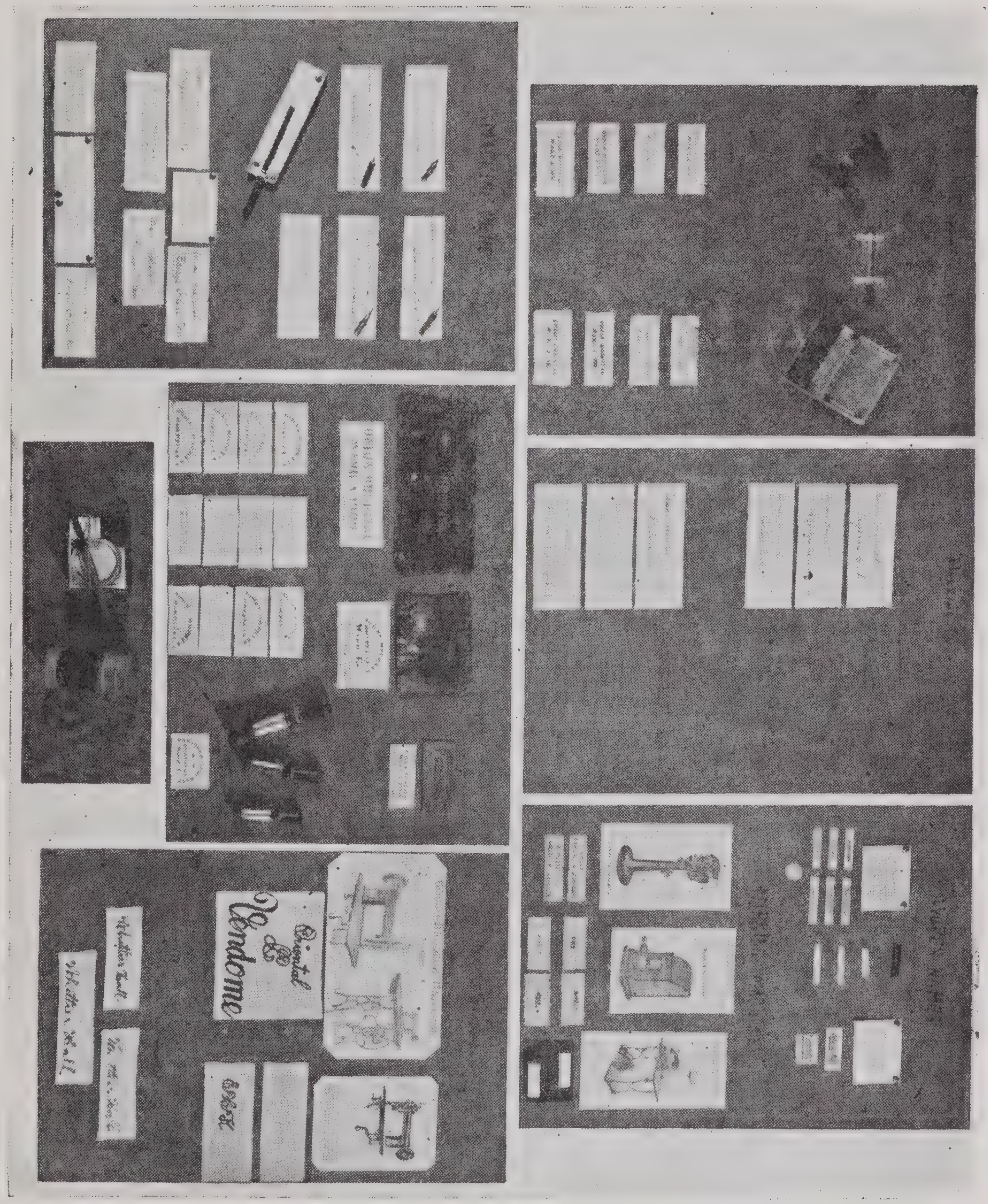


Fig. 23.—Other types of marking. Study made by Linette Parker.

pens. This small outfit makes marking easy for the housewife. For the institutional laundry, ink should be purchased in one to five pound containers, from laundry-supply houses. Such inks require no setting of the mark.

Place to Mark.—This point has been the subject of much study, in the hope that the place and the mark may be so standardized as to establish a real system which can be used in all institutions and in all commercial laundries. A garment usually washed in a laundry near the Atlantic should bear such a standard mark as would be entirely serviceable in a laundry near the Pacific.

The place of the mark should be inconspicuous, but at the same time so accessible that the checking of the garment in and out of the laundry may be quickly and easily done. It is poor marking if it increases the time and labor cost in the laundry because the mark is hidden. In marking flat work each institution should decide the exact place where all linen of one kind is to be marked. Many institutions have proven that it is quite to their advantage to establish, even to measure the exact position in relation to hem and selvage of a sheet. Double marking, wherein alternate corners are chosen, is considered by some to be enough of a time saver in the laundry to warrant the extra time cost in the marking, because, as the folders from the ironing machines fold the flat pieces either one way or the other, the distinguishing mark is sure to be uppermost.

Institution marking and home marking are entirely different. In the institution time is the great object, whereas the housewife is anxious for the mark, unless ornamental, as an embroidered letter, to be placed inconspicuously. The commercial laundries are trying by charts sent out from their organizations to individual laundry owners to establish on standard garments the exact place where all laundrymen belonging to that association may expect to find the mark. Any garment that has bands, for example, should be marked on the wrong side of the band. It would be even better if the standard not only required that it was to be the wrong side, but also determined whether it was to be on the right side of the fastening or on the left side. Garments that button may be marked on the button side, so that the lap with the buttonholes covers the mark when the garment is being worn. To overcome the bad method of crossing out old marks, and re-marking each time, a little care will help; if a garment, especially a collar, goes to a different laundry, it is possible to add a letter or a figure to those already on the garment. This one mark would be less conspicuous and unsightly than the usual collection which a collar has. Tray cloths, doilies, table covers, handkerchiefs, and all flat goods in which it is almost impossible to hide the mark, should be marked in the corner on the wrong side.

Marking is still necessary for the work that is to be washed and ironed in a laundry, since the cost of handling the garments of each individual in such a way as to insure no loss would necessitate much extra expense. Nevertheless, so much objection is made to marking this flat linen, especially handkerchiefs and napkins, that it is becoming customary to wash these small pieces in laundry nets. These nets can be small, so that one is used for the pieces of each individual. Metal marking pins, which mark the wash by nets, are purchasable through the laundry-supply houses. The laundry-supply houses stamp these pins with any term which designates the use to which they are to be put. The wet-wash laundries and laundries doing family work overcome all difficulties and expense of marking by washing entirely in lots. These lots may be divided by nets which are large enough to hold a half or a quarter of a thirty-pound wash, so that all that is necessary is to pin the mark to the individual bags. The most modern way, which is now being accepted by the trade, is the use of washers so small that thirty pounds of dry clothes is their capacity; or larger washers are being divided so that each division holds thirty pounds. This means that not only is marking made unnecessary, but all use of nets or pins, because the wash of one individual is kept separate from that of every other individual.

As a means of offering practical suggestions to the housewife concerning the place to mark, the following list is given. It is selected from a more extended and detailed list made up by the National Marking Machine Company and published in the *American Outlook.*

I. BUNDLE OR STARCHED WORK

Pieces	Places to Mark Goods
Shirts	Mark shirts 8 inches below bosom strip or 8 inches below last buttonhole on buttonhole side. Pongee also there and inside of button strip between the last 2 buttons—tape dark and flannel.
Collars	Right-hand side of brand, should there be enough space between buttonhole and brand or if band is high, put mark there. Always on right of center buttonhole or brand.

I. BUNDLE OR STARCHED WORK (Continued)

Pieces	Places to Mark Goods
Night shirts	At center on collar or band, wrong side.
Under shirts	Between first and second buttonholes, wrong side.
Pajama coats	At center on collar or band, wrong side.
Pajama pants	On wrong side at draw strings.
Union suits	Between first and second buttonhole, wrong side.
Under drawers	On strap, button side. White muslin, wrong side button side.
Socks	Tape all socks and stockings wrong side at top above heel.
Neckties	In center, wrong side; tape if will not hold mark.
Handkerchiefs	Bagged or netted.
Coats	Wrong side collar and seam; lady's coats in arm pit, wrong side.
Vests	Right-hand strap, wrong side or on seam, wrong side.
Aprons	Right-hand side next to string; tape colored pieces all wrong side.
Chemise	Wrong side in arm pit.
Corset covers	Bottom of button side, wrong side.
Drawers	Right-hand side of band on wrong side.
Dresses	On button side at waist line, wrong side.
Dressing sacques	Bottom of button side, wrong side.
Kimonos	Tape at neck in center, wrong side.
Night dresses	Underneath button side between first and second buttons. Under-arm seam, wrong side.
Skirts	Wrong side, right-hand side of band at opening.
Wrappers	Wrong side between first and second buttons.
Waists	Wrong side button side at bottom.

II. FLAT WORK

Handkerchiefs	On one corner only.
Napkins	On selvedge wrong side; do not mark monogram napkins, but tape.
Pillow cases	On wrong side at right of seam.
Spreads	Tape all spreads on corner wrong side.
Sheets	On wrong side at right of small hem.
Scarfs	Tape all on wrong side in corner.
Tray cloths	Tape all on wrong side in corner.
Table cloths	Tape at corner on wrong side.
Towels (roller)	At seam. Tape all crash or towels that will not hold mark.
Towels (hand)	In corner on selvedge. Tape all crash or towels that will not hold mark.
Towels (bath)	Tape all on corner. Tape all crash or towels that will not hold mark.
Wash cloths	Tape all on corner

Questions

1. What schedule of preparation can you work out to lighten the work of the regular wash day?
2. Would you consider it truer economy of time to mend stockings every week or to do a mending-basketful all at one time?
3. How may careful planning of all clothes for the family simplify the task of sorting—and also of wash day?
4. How long before laundry collection time do you count and prepare your bundle?
5. What do you find the best place to mark your garments so that the marks are easily found and not conspicuous? Please chart your results and mail to the author.
6. Problem: Make a time study to prove to what extent preparation on Monday does save time on wash day.

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CHAPTER V

PROCESS OF WASHING ALL CLOTHES IN THE HOME

Method of Washing:

- Soaking
- Washing
- Rinsing
- Boiling
- Rinsing
- Bluing
- Starching
- Hanging
- Drying
- Sprinkling
- Stretching
- Folding
- Ironing
- Folding

Soaking Clothes.—To soak all soiled white clothes is an economy of both time and money. With the cleaner clothes, soaking is less necessary; however, clothing that is soaked requires less rubbing, with a resultant saving not only of the fabric, but of the worker's time and energy as well. Soaking removes all stains that are soluble in cold water—and cold water will dissolve about three-fourths of all stains, because so many stains are of sugar and albumen

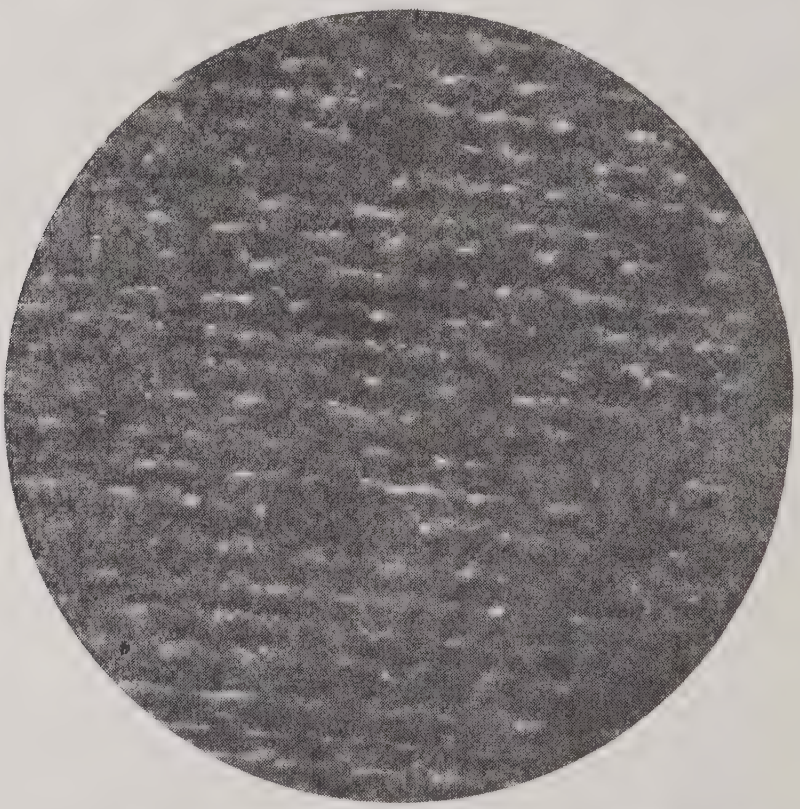


Fig. 24.—Microphotograph of a cloth after being used for dusting. This illustration should be studied in conjunction with Figs. 25 and 26.

composition, and soluble in cold water. Unless one is sure that no stains exist, it is best to soak the clothing in cold water without soap; soap may set stains. It is not necessary to soak the clothes overnight, but if this is done, it is better not to add soap or soda. A little dissolved soda may be added to the water if the clothes are to be soaked only a short time. The soda, by uniting with the grease on the fabric, changes it into a soapy mass, which is readily soluble in water and will float out in the warm wash water. It is best to keep this method for very soiled clothing or greasy fabrics like table linen; never use it for delicate colors or for wool or silk, none of which can be soaked. In any case, never use the soda unless it has been previously dissolved in water.

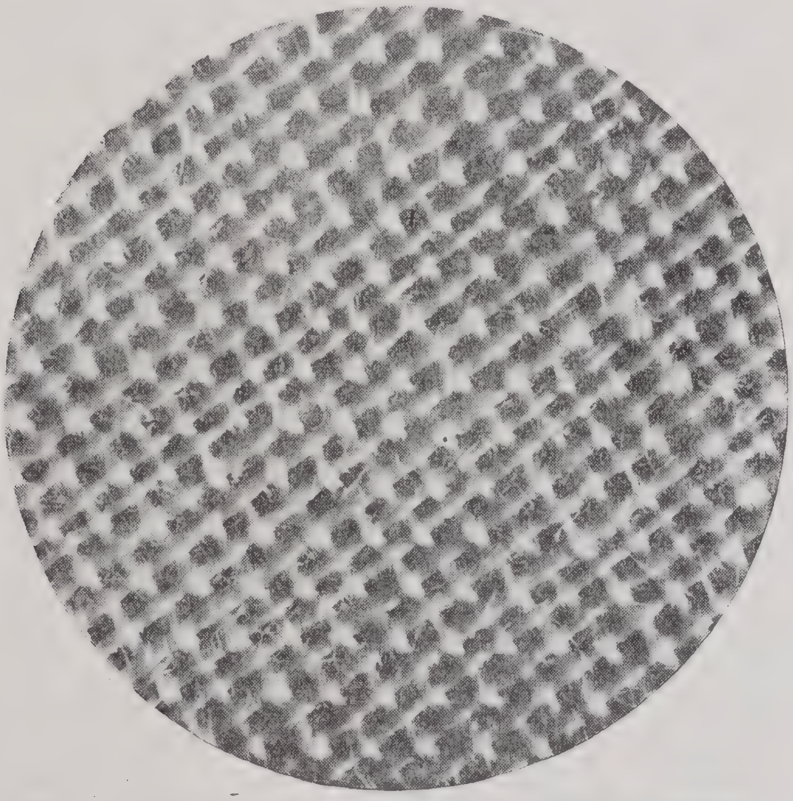


Fig. 25.—Soiled cloth illustrated in Fig. 24, after being cleansed.

Washing.—This process is a mechanical and chemical removing of dirt. The mechanical work is accomplished by force, either friction or agitation, which produces a displacement of the dirt. The water and soap are forced through the fabric, freeing the dirt (Figs. 24-26). This dirt becomes part of the soap suds, either because of the physical carrying power of the water, or because of its solvent power. The chemical changes, which are produced by the action of the various cleaning agents, cause the dirt to be removed either because it has been rendered soluble or because it has combined with the cleaning agent to form a new compound, soluble in water. If the soil is of the nature of a stain not soluble in water, or not able to become a part of the soap emulsion, the garment must be treated with chemicals which will dissolve the stain. To dissolve the stain does not necessarily mean to dissolve the fabric, as many people are inclined to believe.

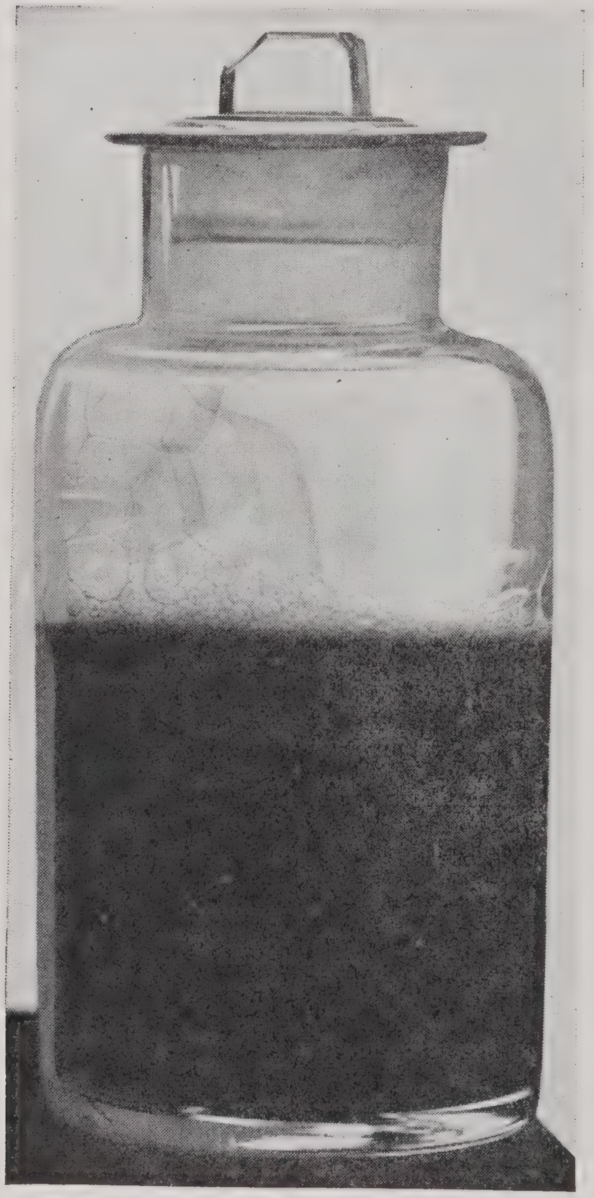


Fig. 26.—Water in which soiled cloth (Fig. 24) was washed.

Washing methods have advanced by many stages from the primitive method of washing clothes in cold stream water. The purely physical means of displacing dirt necessitated by that method—such as treading and pounding—have likewise given way to better tools and equipment. The modern idea is to reduce both time and work as much as possible, and at the same time to prolong the life of the fabrics. For a more detailed discussion of primitive and foreign methods of washing, see Chapter XXV. Modern home equipment will be found in Chapter XX.

If clothes have been soaked overnight, on wash-day morning wring them out of this water and prepare fresh hot soapy water for the washing process. The water used for soaking should not be heated and used as suds, because any albumen from body excretions, as well as from eggs, milk or cheese, like those on table linen, will coagulate when the water is made hot for washing, and a scum will be deposited on the clothes. Fill the tub half full of clean, hot water and make good suds, which will soften the dirt by its heat and will cut the grease element holding most of the dirt remaining in the fabric. If it is necessary to save water, use the wash water for two sets of clothing by adding extra warm water and more soap. The soap should be applied directly to a very soiled part of a garment, such as a hem of a petticoat, a neck or a collar band, and to specially soiled garments such as a baby's bib or a towel. Keep good suds, as they float out the displaced dirt.

If the washing is to be done with a tub and washboard, have enough water to produce good suds with the soap, but not enough to splash out over the rim of the tub. Special soiled parts should be rubbed directly on the washboard after soap has been applied. To rub, and yet to save the fingers, gather upon the board enough of the fabric to cushion the hand and then do the rubbing with the hard part of the hand. The fingers only gather and shift the material, so there is no need of rubbing the knuckles. Pass the garment systematically over the board and rub both sides, or, on a long piece, from end to end. Any fabric that, after being soaked in cold water, is washed regularly and thoroughly with good soap, will give good color returns. For certain work, like soiled jumpers, overalls, or corsets, a stiff, short-fibered scrubbing brush may be used to good advantage. Scrub the garments on both sides.

Washing by Machine.—If a machine is to be used instead of the washboard, keep plenty of good suds throughout the washing process, and allow time for the suds to attack the dirt as thoroughly as if the soap were rubbed on by hand. Washing in a machine is a special process, but at all times it copies hand work, differing only in the largeness of the quantities done at one time. Time for each process is less in the machine method, because the machine action is regular and continuous and produces friction and agitation in a greater degree, causing the work to be done faster than in a washtub. Most family-size washing machines are of about six or seven double-sheet capacity. By weight, which is the most satisfactory rating, the machines carry about eight to ten pounds (dry weight) of clothes.

These machines will gain greatly in efficiency if they have their water supply piped directly to them, and also have a piped outlet for waste water. No machine will do its most efficient work if the water must be pailed in and out. A waste pipe or hose can always be arranged, even if piped water supply is impossible. The washing machine ought to be assured very hot water to act as a scald, which may take the place of boiling. There are two ways of operating the small machine. One is to make use of the same formula as for the large washer (page 74); the other is to alternate the machine with the washtub in the various processes. This latter method must be followed where saving of water is necessary; but it necessitates handling the clothes, and if the housewife bought the machine to reduce effort, she ought to be interested in establishing a work formula which makes this possible.

As soon as the housewife makes the machine a labor saver, and realizes that it can be a time saver as well, she will demand that the manufacturer put on a motor strong enough (even at higher cost) to operate continually on the "shift-of-water" system instead of the "shift-of-clothes" system; that is, the clothes are left in the washer and the water is changed instead of the clothes being changed from tub to tub. Thus, while the machine is doing the washing, she can plan to spend that time in other processes of the laundry work, or can re-schedule her housework so that during the ten minutes while the machine is operating, she is making beds or washing dishes, or caring for a garment which must have special treatment. The emptying of the water on the "shift-of-water" system will require about three minutes' time, more or less, depending on the size of the outlet pipe. It is well to have a large outlet.

However, not every type of power washer is adapted to this "shift-of-water" system. Of the three types—the rotary, the oscillating, and the pressure and suction machines—the rotary is best adapted to such a system. The oscillating machines must be brought to a standstill to fill and empty; while the pressure and suction machine, unless equipped with an extractor appliance, must be emptied either by lifting out the clothes first, or by letting the water drain down through the clothes. If the drainage outlet is small, and the clothes are left in the machine, the water will drain slowly through the clothes, causing them to be a strainer for the dirty water, so that more rinsing will be necessary in order to free the clothes of the dirt and sediment.

Many of the small power machines made for home work do not yet meet the need of the housewife in as complete a way as will be possible when she is willing to modify her methods and when the manufacturer does some reconstructing of the machines. The housewife has clung to the old method which necessitates her handling all the clothes between processes, and which requires that the clothes be hung on the line to dry, only to be dampened again, before being ironed. Therefore, she has made no demand upon the manufacturer to have large delivery outlets on all washers, nor has she asked for more powerful wringers, strong enough to prepare a sheet, towel, or tablecloth to be ironed directly on the ironer. A machine so constructed may be a trifle more expensive, but if the extra cost were reckoned in the saving of time and effort, it would be too small to estimate.

Hanging, drying and sprinkling require much time, which can be eliminated by using the new methods and some of the newer supplies. There is on the market, for instance, a modified starch which does not require drying before it can be subjected to the heat of the iron.

Wringing.—Each time a garment is passed from one tub to another, the water from the first tub should be wrung out. This wringing should be done with the garment in straight folds. If it is put through the wringer, hold it with one hand so that buttons may go through flat (Fig. 27). Wherever possible, fold the buttons in; they will not only be less likely to be torn off, but they will have no chance to mar the wringer roll. Do not have the wringer too tight for table linen, which creases very easily, or for pieces having heavy embroidery.

Boiling.—If the clothes are to be boiled, they should, after being rinsed, be wrung out and soaped all over, especially hems, neckbands, and wristbands, and then be placed without packing in the boiler with clean, cold water. Small pieces of soap or soap chips—one-fourth cup of dry chips—can be quickly dissolved in hot water and added to the water in the boiler. Have enough water to allow the clothes to float freely and never be out of the suds, and enough soap to produce suds as the water heats and the soap goes into solution. The amount of soap to be used cannot be given definitely, because the hardness of the water and the amount of grease in the clothes control conditions. If the water is hard, more soap is necessary for boiling as well as for washing, because if there is not enough soap to overcome the hardness of the water, a gray, grainy scum will form on the clothes. This scum, known as lime soap, is most noticeable in the boiler. To avoid the formation of lime soap, have, if possible, soft water; or soften it by boiling it before using it for laundry purposes. The lime soap formation may also be largely prevented by starting the boiling process with an extra amount of soap or dissolved laundry soda. Should the scum form, in either the boiler or the washing machine, add more soap or dissolved laundry soda. Unfortunately, the scum is sometimes not noticed until after the clothes have been washed, and dark streaks have formed in hems or folds of tucks. In such a case, rub the streaks with kerosene and then wash the garment in hot soap suds.

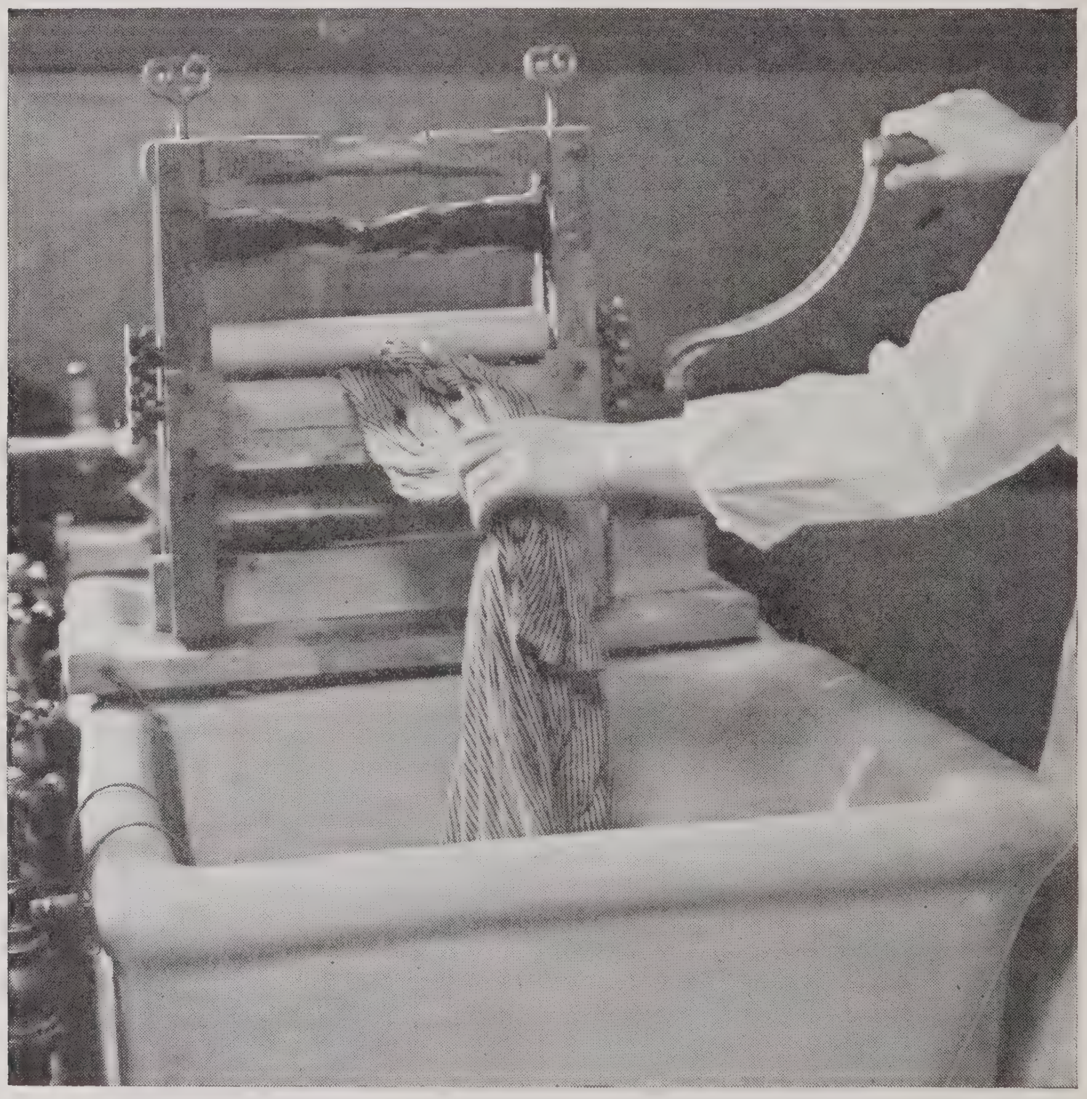


Fig. 27.—The proper method of putting clothes through hand wringer.

The clothes and suds in the boiler should heat slowly. A long period of heating before boiling does much to produce good color, because the fibers of the cloth loosen and set free the dirt. To save the fabric, and yet whiten it, cover the clothes with scalding water and let stand. Such a temperature is about 180° F. In cases where boiling seems necessary, bring the clothes to a boil and let boil briskly for five minutes. Stir and press the clothes down into the boiler with a clothes stick. If there is plenty of water, the clothes can be easily moved about.

While the first set of clothes is scalding, rub out the second lot in the same manner as given above, and prepare them for boiling; then continue with the third, until all clothes are washed. If the boiler cannot have clean water each time, empty out a part and add cold water for a second start.

Clothes need not be boiled every week. If, each time they are washed, they are soaked in cold water and are well rinsed to remove all soap and all dirty water, they will keep a good color. Do not over-wear clothing, as frequent washing does much less harm than the vigorous rubbing or strong washing agents needed for very soiled clothes.

Rinsing.—Thorough rinsing in plenty of water is essential to good work (Fig. 28). A tub of rinse water will not take care of as many clothes at a time as will the same amount of wash water. There must be plenty of room for the clothes to be agitated in the water, since it is this agitation which dislodges the soap and the loosened dirt. Since there is no point in soaking the clothes in the hot rinse, better results will be obtained by vigorously rinsing a few pieces at a time. The first rinse water should be hot in order to prevent the soap suds from hardening on the clothes as a greasy scum.

A second hot rinse does so much to clear away the grease, the soil and the soap, and rather than not rinse it would be better to pass the clothes from one tub of hot water to a second by holding them on a stick, not taking time to pass them through a wringer. The two waters, so very hot, will bleach as well as rinse. When washing in a machine which is properly connected to the plumbing system, the second hot rinse can be a scald as well as a cleaner. To save water, such hot rinses can be used as wash waters for a second lot of clothes.

The hot rinses should be followed by a cold rinse to prepare the clothes for the blue water, which is cool. This cold rinse is essential, as hot clothes would absorb too much blue. The worker need not subject herself to the shock caused by putting the hands into extremely cold water, since the hot clothes will bring this rinse water up to a comfortable temperature. The use of a clothes stick will save many shocks, both from extremely hot and extremely cold water.

Remember that it is not possible to over-rinse. Two hot rinses will be more likely to remove all soap than will one, especially if it has been necessary to add laundry soda to the suds. Gray, grimy clothes usually result from under-rinsing and over-bluing. Yellow clothes may, in some cases, be due to iron in the water, but this is not generally the reason. They are most often caused by the use of an excess amount of soda, which has not been completely rinsed out. When certain blues, containing iron, come into contact with this soda, iron rust streaks or spots will appear. Such stains as these would be avoided by thorough rinsing. The requirement for thorough rinsing is that the last water be clear.

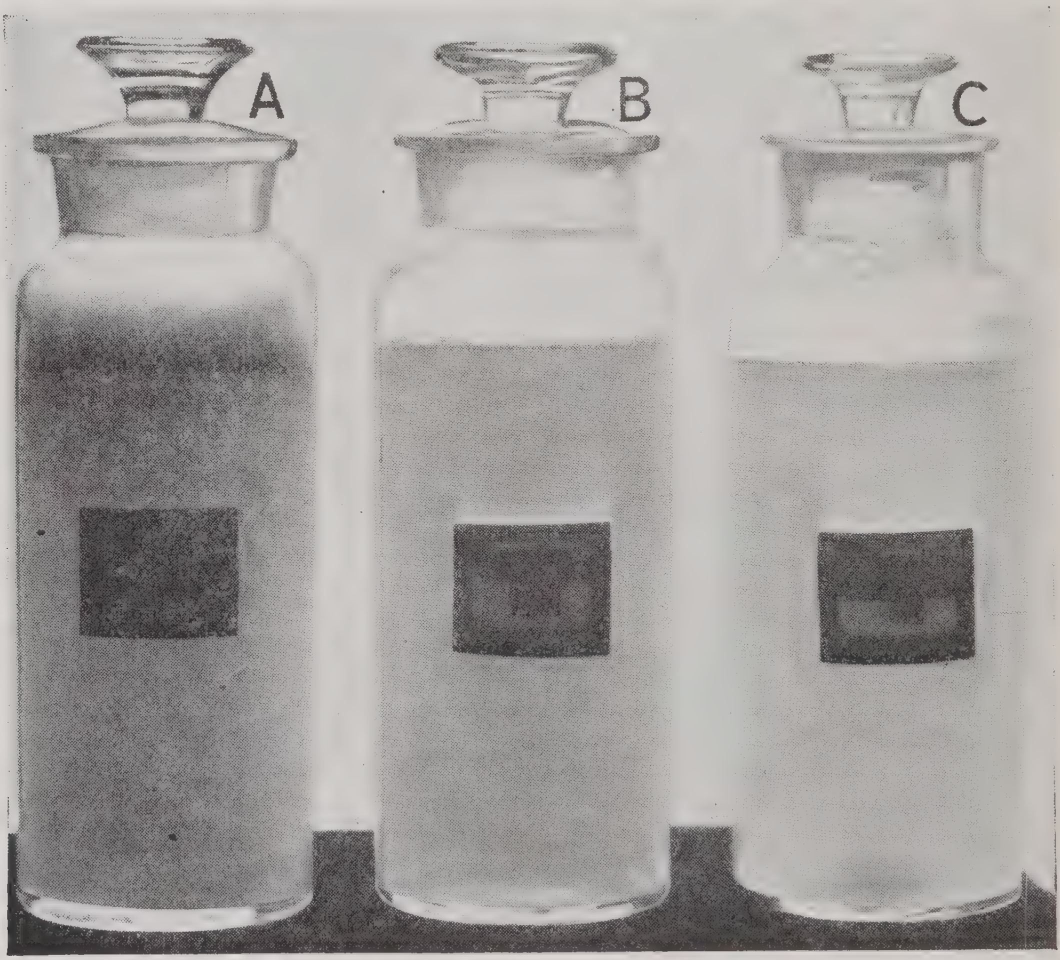


Fig. 28.—Study showing the successive stages of the solubility of dirt. A, represents the water used for washing soiled clothing. The dark color indicates the extent to which soap and water take dirt from the fabric. B and C, are successive hot rinses. Note the amount of dirt as well as soap that is carried over from the first water; even C, is not entirely clear. This study should prove the value of thorough rinsing.

Bluing.—Bluing is used to counteract the tendency of clothes to turn yellow. Blues vary so in quality and in solubility (see p. 110) that it is quite impossible to give a rule of definite amounts, but practice will soon teach the worker how much to use. As a suggestion, use about one teaspoonful of prepared liquid blue to two gallons of water.

In the process of making the bluing water, the water should be well stirred each time bluing is added, so that the whole tubful may be of even color. Test the color by holding the hand about two inches under the water to see the degree of color, or by bluing a small garment. Blue water should not be too deep in color, and should be lighter for thin garments than for heavy ones.

The clothes should be opened well before being put into the blue water, so that they will not be streaked with blue. Stir the water well just before adding clothes, because some blue may have settled to the bottom and will streak the garments. The clothes, if quite yellow, may remain a few minutes in the blue water; otherwise one or two dippings will be enough. To over-blue clothes, especially if they are not entirely clean, will make them gray. Certain blues, that are in the nature of dyes, will, if used in excess, definitely tint the garments. For a detailed discussion of blues, and of bluing methods, see Chapter VIII. If the worker has proven that she can wash in the machine on the shift-of-water method, she can blue her clothes in the machine. Put the cold water in the machine, using more than for suds or rinsing. Mix the blue in a pail of cold water and, with the machine in action, add the blue. (See also Chapter VIII.)

After the clothes have been blued, they are wrung, are then starched or not, as is necessary, and hung to dry.

Starching.—The thickness of starch used depends upon the articles to be starched. Starch is used: (1) to stiffen clothes, as collars and cuffs, or dresses; (2) to make them look well by giving the gloss of new material; (3) to keep them clean longer, by giving them a smooth surface which resists moisture and soil. Borax is added to the starch to give a gloss and to whiten and stiffen the clothes. The wax, paraffin, or lard added to the starch paste serves to keep the iron from sticking as well as to add a gloss or smooth finish.

Raw starch is used on few garments today because it increases the work of ironing. It requires very hot irons—hot enough to cook instantly the starch in the garment, and the worker needs much experience in order to be able to do good work. For details concerning starch and methods of starching, see Chapter IX.

Hanging and Drying.—If time is not the controlling influence, clothes may be hung to dry in the open air—excepting, perhaps, in very stormy or cold weather—for they will be sweeter and have a better color. Freezing does not harm cotton or linen, but does cause wool to shrink. The disadvantages of drying clothes in freezing temperatures are quite worth considering. First, there is the danger of tearing the garment because the fabric has frozen to the line, to the pins, or one thickness to another. Frozen clothes are brittle, and any folding or handling of them will often crack the fabric. Second, since the frozen clothes are not thoroughly dried, the left-over moisture will thin the starch. Drying starched clothes in a high wind will also result in reducing the degree of stiffness of the finished garment.

The line should be secure, stretched taut, and perfectly clean. Wipe carefully all wire lines, to remove dust streaks and any corrosion that may have been formed. The pins should be clean and of such good quality that they do not leave a wood stain. New wooden clothes pins should be washed before using. Keep hemp line and pins in a bag when not in use.

With hanging on the line, as well as with taking down, much saving of time and effort will be accomplished by having the garments grouped. This grouping is not a task to be attended to out of doors, but should be the natural sequence of careful sorting and well-organized washing processes. (See p. 43.)

White clothes may be hung in the sun because the sun bleaches white—it fades colors, especially when wet. Silks and woolens are dried in the shade. Every piece of clothing which was turned wrong side out for washing and starching is hung to dry that way. Always open the garments and shake them well to remove wrinkles and creases. Hang straight and with the wind, *i.e.,* so that the wind will blow through the garment rather than against it, thus avoiding the tears that result from strain. Fasten to the line by pinning the bands, if possible, never by corners. If enough of the garment is laid over the line before pinning, there will be less danger from tearing than if only corners and edges are pinned. Care should be taken to have all clothes securely pinned to the line, to avoid loss as well as tearing. Good hanging, and careful folding of the clothes when they are taken from the line, will do much to reduce the work of ironing; so much, in fact, that it may be possible to smooth bedding and towels without ironing them. This is a reasonable way of reducing work, when there must be a saving of time.

If the flat work is to be ironed, much work can be saved by taking it from the line when it is slightly dry, and rolling. This eliminates the work of sprinkling. Moreover, the dampness of the linen is evenly distributed, which, especially in the case of the table linen, is very important for good ironing.

Sprinkling.—Careful, uniform sprinkling helps much to improve the results obtained by ironing (Fig. 29). Several kinds of tools can be used for this purpose. (See p. 239.) A device which sprays the water will give better results than hand sprinkling, which is, of necessity, uneven. Warm water penetrates the fabric more quickly than does cold water.

After the clothes have been sprinkled, stretch them into shape and roll tight, being careful to fold in all lace, embroidery, tucks and hems. Press or pound the rolls to distribute the moisture, and pack them close together in a basket lined with heavy, clean, white cloth. Handkerchiefs, napkins, towels and other small pieces should be stacked in piles of three or four to be sprinkled. This helps to spread the moisture evenly, and prevents both excessive moistening and rapid drying.

In warm, muggy weather it will be found safer to sprinkle the clothes early on ironing day, rather than the night before, as this warm, moist condition may cause mildew to grow. If mildew does form, it may, in its very early stage, be washed off, but it must be very fresh if it is to be removed by any agent other than strong bleaches. Later, even these are useless, only weakening the fabric. (See Mildew, pp. 16, 39.)

Ironing.—Certain rules will help the ironer (Fig. 30), but ironing is an art, and the best results will come only from the practice of frequent doing. All embroideries and laces should be ironed on the wrong side with a soft pad underneath, so the pattern may sink into the pad and not be flattened by the iron. Tucks should be pulled taut and ironed lengthwise, and at the same time downward from the upper part of the top tuck to the bottom tuck. Iron dry each part before beginning a new part. Goods left half dry or half ironed will pucker and look rough dry when finished. Ruffles

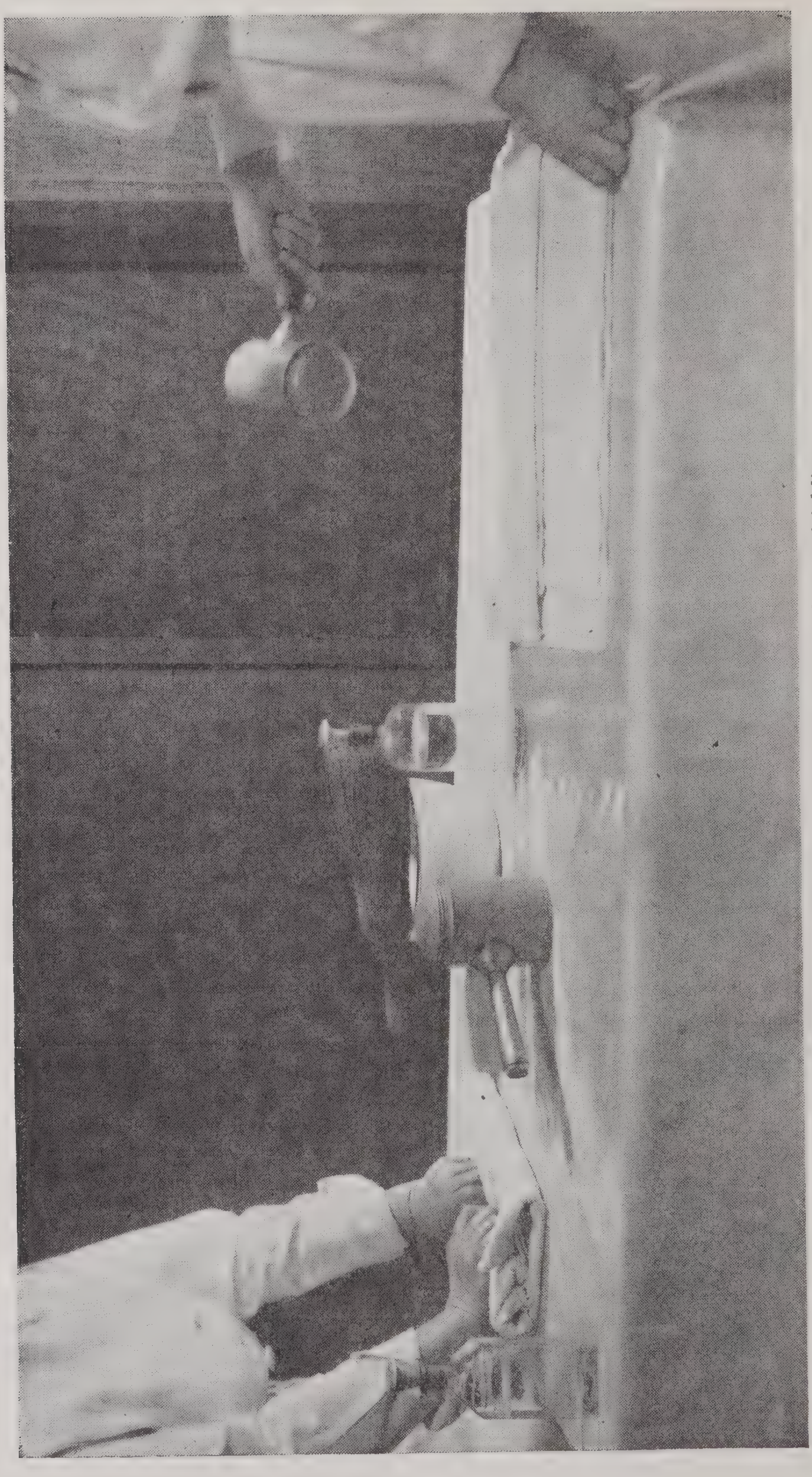


Fig. 29.—The proper method of sprinkling and folding.

should be ironed by ironing straight on the hem edge, and then by ironing up into the gathers. "Nose" the iron well between the gathers. A small pointed iron will assist in this work. Sleeves, ruffles, in fact all parts of the garment that may be ironed and allowed to hang over the board, should be done first.

All hems, tucks, and bands require extra pressing, as they are thick. Use heavy broad irons for heavy bedding and table linen, and light, more pointed irons for body clothes. The irons should be smooth and very clean and sufficiently hot to "hiss" when touched with the moistened finger. An iron is too cool when the moisture on the finger does not turn instantly into steam, but may be seen to bubble on the iron. On the other hand, an iron that is too hot will cause the moisture to evaporate so instantly there will be scarcely a sound. Beware of this kind, as it will cause scorch, which of course is injurious to the fabric.

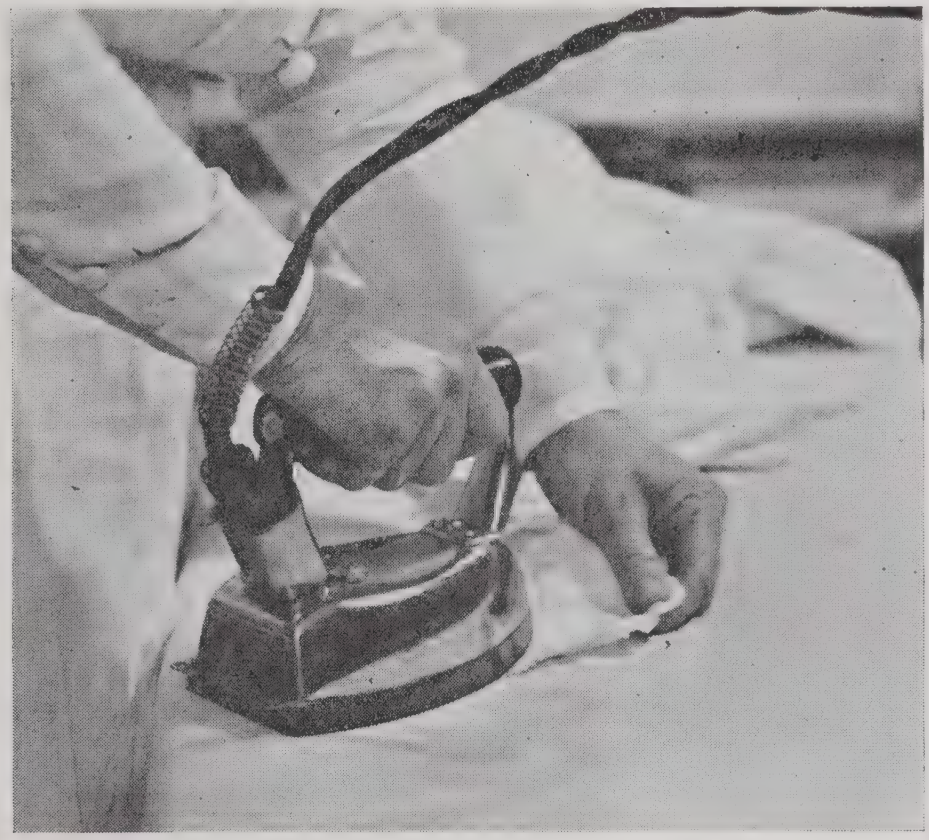


FIG. 30.—Hand ironing. Good manipulation, with the left hand always preparing the garment for the iron.

MACHINE IRONING.—See Chapters XI and XII. General help may also be obtained from Chapter VI.

Folding.—Care should be taken to fold the clothes according to the directions given under special chapters. (See Chapters XI and XII.) Much depends on the folding because a garment carefully folded will wrinkle less; moreover, good folds may do much towards shaping. Fold the garment by laying it first on the table and then into its particular fold. (See p. 143.) Let all garments hang to air on a clothes-horse after being ironed and folded (Fig. 31). Clothing to be mended should be set to one side; in this way there is no need of unnecessary unfolding and folding to look for rents and tears, and, at the same time, none escapes. These unmended garments need not be folded carefully, but should be kept in order so that the entire work of ironing may not be spoiled.

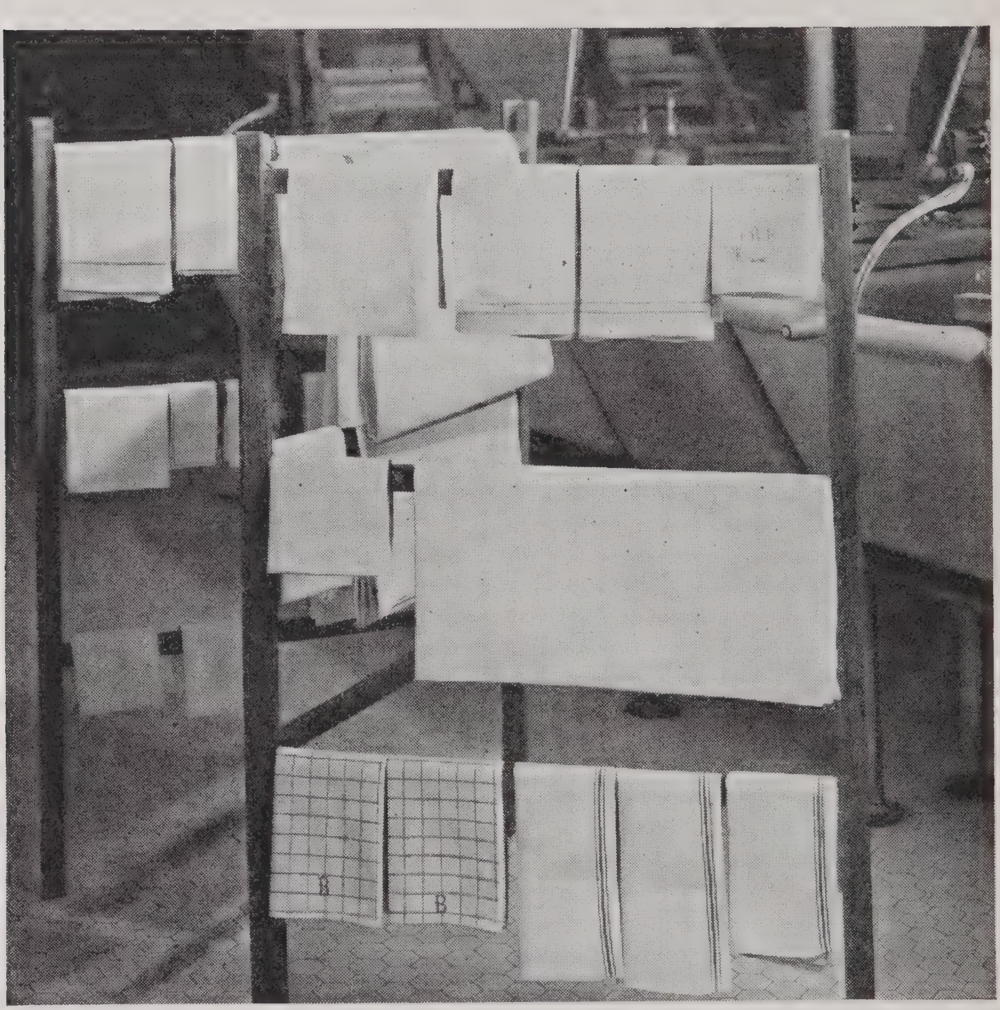


Fig. 31.—Ironed linen hung to air prevents wrinkles and mussing.

Questions

1. What economies have you worked out for wash day?
2. Should a garment be greasy, what safe grease solvents could be added to the soap solution? What is meant by safe?
3. Why put clothes to soak? What happens? Why is it not advisable to put dirty clothes directly into a clothes boiler and soak, and then wash in the same water?
4. Why are clothes that have been washed with plenty of soap not always white in color?
5. Under what conditions should clothes be boiled? To what extent does boiling clean clothes?
6. Would the principles established for hand washing be applicable for machine work? Just where is the difference?
7. Problem: Given a family wash to finish without assistance, in what ways can time and effort be reduced from start to finish? Consider and compare hand washing and machine washing.

CHAPTER VI

PROCESS OF WASHING ALL CLOTHES IN THE INSTITUTION

Institution methods of washing clothes follow the general rules laid down for home work. But the clothes are handled in large lots, belonging often to many people, and are laundered by means of large power machines. There are, consequently, many points of variation from ordinary home methods, many problems peculiar to institutional work.

Mending.—Mending ought to be done in the institution, as well as in the home, each time the clothes are washed and before they get into circulation. Much help can be rendered by the ironers if, as they fold, they separate the torn linen by dropping it, partially folded, into a basket. The mending room, with its worker who cares for the regular house linen, is well placed when in close conjunction to the laundry. This relationship is made even more helpful if the linen room with its supervisor is a part of the laundry department.

To what extent mending should be done is a question worthy of much consideration. Such a question can be answered after a strict account of the cost of new goods, the time the garment has been in service or its service life, the cost of labor for mending, and the extent to which the made-over garment may continue to be of service. This service is two-fold: either as a mended patched garment, or as a smaller garment, made from the best part of the fabric. The left-over pieces finally may be of service as window cloths and for general cleaning.

In state or city institutions where the residents are dependent upon public support and, in return, give such service as they can, the mending is done at little cost of labor, and for that reason more making-over and patching is allowable. Darning machines, and all sewing machines constructed for fast work, should be considered a necessary part of the institution's equipment. The sewing machines may also make new furnishings at a cost reasonable enough to permit the purchase of better material.

The economy of making sheets and mattress covers, hemming towels, and the like, in the institution must be decided after a careful study has been made. This study should include: the cost of materials purchased in wholesale quantities *vs.* the cost of ready-made pieces; the comparative qualities of materials and of ready-made pieces; the cost of labor—in state institutions very small, in others perhaps very large; the variability of ready-made pieces *vs.* the standard quality of material purchased wholesale, with the added possibility of special sizes for special needs.

Marking.—See Chapter IV, p. 44.

Counting and Sorting.—Close attention should be given to both of these tasks in any laundry, whether it be large or small. Institutions that do it have greater opportunity to check up loss of linen, as well as wasteful use of linen.

As one suggestion, in dormitories the students' linen may be checked by having them bring their soiled room-linen to exchange for clean. At that time the supervisor may check the stains for which no one is ever responsible, and which give the linen such an unsightly appearance. Should stains like ink, iron rust, shoe blacking, and dye be found, the student may either have the stain removed at his expense, or else pay the equivalent of the worth of the linen at the time.

Two problems recently brought to the author illustrate well the difficulties all supervisors must meet. The first was that of a new bedspread—cost $1.85 wholesale—which had been marked and put into service two weeks before it arrived in the laundry. When it reached the laundry, there was on it an ink stain that from its size represented the spill of at least a half-bottle of ink. The problem presented two questions: How much is the spread worth? What will it cost in time and chemicals to remove the stain and save the spread? One solution of the problem would be for the housekeeper to use the spread to teach a worker how to remove the stain, and another, to charge the student for the chemicals used. Such an experience would have value in teaching the care of other people's property, a realization of the time and labor cost of such mistakes, and the knowledge required to correct them.

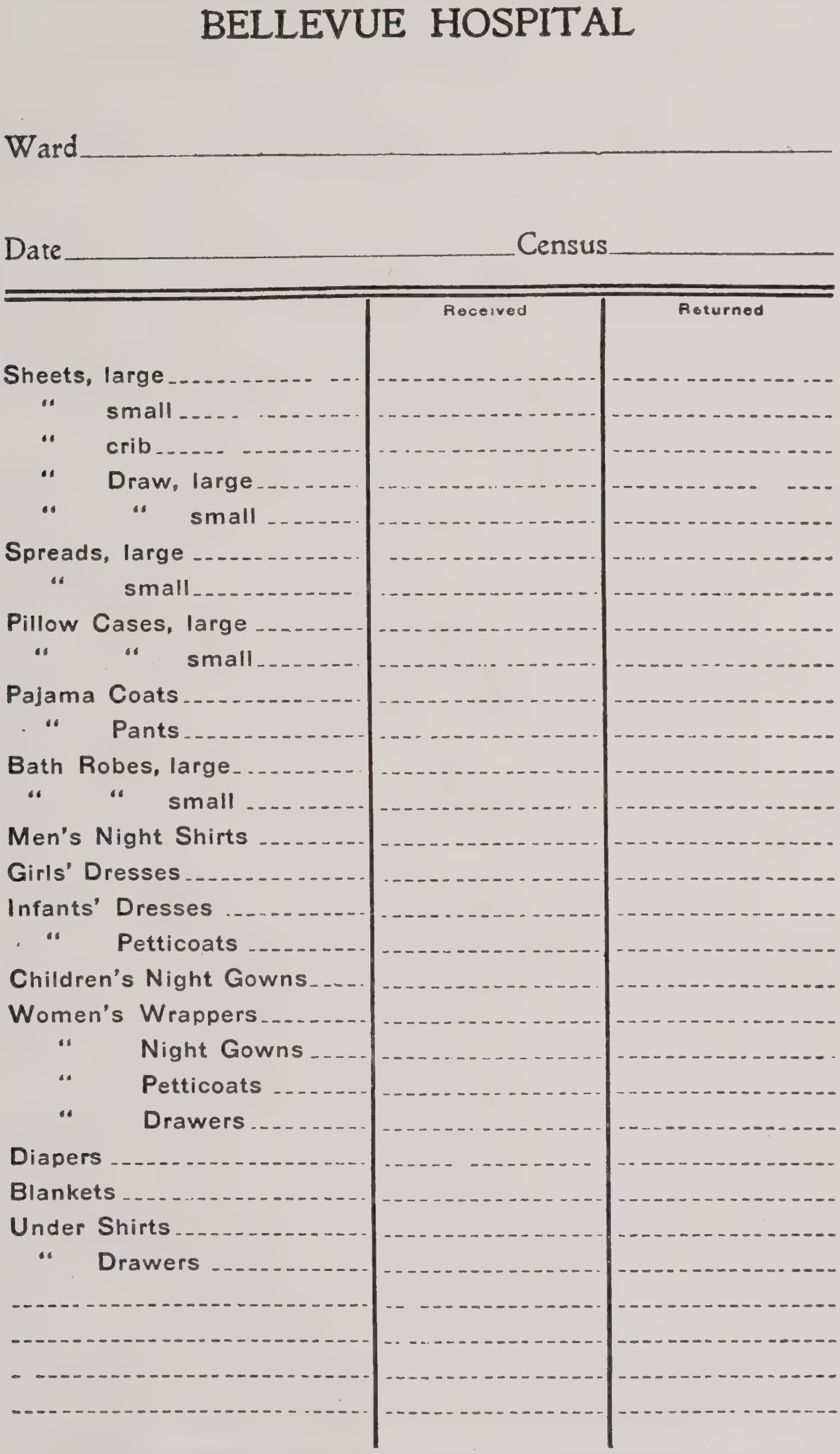
The second problem involved the renewal of a smaller, less expensive, and more-used article. A bath towel—original cost, fifty cents—had given a year's service (about one-third its life), and at the end of that time was almost completely dyed with shoe polish. These questions present themselves: How much time and chemical should be spent for renewal? Is it cheaper to take out stains or to pass the garment down to the cleaning cloth service? Shall students, by furnishing their own linen, learn its value?

Which is the greater saving to the institution—student ownership of linen and its accompanying cost of handling, or institutional ownership with the expense of loss?

The laundry department seems to have different supervisors in different institutions—the housekeeper, the linen-room supervisor, or the head of the laundry department. If the laundry is responsible for purchase and care of the linen, the laundry supervisor is the one best fitted to do the checking. Many institutions, especially hospitals where loss is great, and where checking up is most essential, are doing a double checking of soiled and clean linen through the use of two checkers. The soiled linen received is really the basis of the check-up throughout the whole plant. The plan is to have two representatives responsible; one representative is a worker on the ward and the other a worker sent to the ward by the laundry department. This checking by both departments is a fair settling of a difficulty that the laundry usually has had to meet alone. Worker on Ward C, for example, makes out her list according to her count and signs the slip. The laundry representative counts the Ward C linen in Ward C before it goes to the laundry and signs the same slip. Here is where the check-up of both representatives must agree. On its return, the clean linen is again checked by representatives of the two departments, and the original slip is signed again.

In the *counting* of the soiled linen the sheets, pillow slips, towels, etc., are sorted before being counted, and after being counted each pile or lot is put into a bag of its own. This saves much handling and reduces to almost nothing the sorting of finished work. At this last sorting the torn or worn linen should be withdrawn to be mended, and the amount taken out be replaced by new or mended linen. The count going back to the ward is thus identical with what was received.

To the person who is considering using this method the question will arise about the work and the time used. No one in the wards has ever really considered the time used in the laundry and the large amount of blame laid at its door for loss. If the probation nurse can help in this checking and sorting, it will enable her to appreciate the value of linen and the problems of the laundry. By this method everybody shares the work and the responsibility, and the count is checked up with such directness that there is no loss. One report shows a loss of only one nurse's bib in one month. The method also serves as a good check-up on new and old equipment.



BELLEVUE HOSPITAL

Ward____

Date________________________Census____________

	Received	Returned
Sheets, large		
" small		
" crib		
" Draw, large		
" " small		
Spreads, large		
" small		
Pillow Cases, large		
" " small		
Pajama Coats		
" Pants		
Bath Robes, large		
" " small		
Men's Night Shirts		
Girls' Dresses		
Infants' Dresses		
" Petticoats		
Children's Night Gowns		
Women's Wrappers		
" Night Gowns		
" Petticoats		
" Drawers		
Diapers		
Blankets		
Under Shirts		
" Drawers		

FIG. 32.—Checking-in slips used at Bellevue Hospital, New York City.

In counting towels and napkins before washing, pick up each piece by the corner and hold until the ten count is complete. This method insures napkins and towels being opened before going into the washer. Table cloths and sheets should be unfolded to be counted, as they are dropped into hampers. Unless such unfolding is done at the beginning, it may not be done at all, for the machine will often carry such a garment through every stage of the wash without its being unfolded. Dresses should be turned wrong side out, sleeves and all, and a string tied about dress and sleeves at the bust line. This saves the buttons and keeps the sleeves from dragging. Handkerchiefs, collars, and cuffs are put into nets to save handling. Aprons and bibs with straps or strings must have special attention, or the strings will knot and tie the other garments into bundles, causing a great hindrance in carrying on the work as well as risk of tearing. Several methods are employed: fold the strap or string in half, then in quarters, and snap an elastic around the fold; or knot each strap by doubling in half before tying. Many institutions find it much more economical to have separate bibs for the uniform apron, because a starched bib will keep clean longer and may serve two aprons. In this case the bibs can be washed in nets.

Sorting in the institutional laundry is done in a more general way than in the home laundry. The usual division of the soiled clothes is into flat work—which is subdivided into table linen and bed linen—and body linen. The body linen may be combined with the bed linen if quantities of each are small; otherwise keep them separate as it will help in every process following the washing. Colors are usually washed by themselves, but are rarely divided into shades of color. If colored dresses are put into nets, a few garments of each color in each net, it is found that the color is not likely to bleed or streak into the neighboring pieces, the cord of the net being sufficiently thick to keep them separate. The usual precaution of reducing the temperature of the wash water also helps much to prevent bleeding of color. Woolens and silks should always be handled in separate lots. For special work the three groups—colored clothes, woolens, and silks—are often washed by special wash formulas, with special soap to avoid any chance hardening and yellowing of wool and silk or bleeding of color. A special sorting ought to be done to separate the stained garments if the work is to be high class. Most institutions cannot afford the time or extra expense that is produced by the work of removing stains from single garments; but it is possible to have a wash of collected material that is stained with iron rust. (See p. 78.)

Washing.—In an institution the washing of most linen is done by machine, because the quantities of clothes are too large to be washed by hand.

The first thing to consider is the hardness of the water, since this has a direct influence upon the formulas to be used, unless use is made of a special water softener. (See p. 296.)

Load.—Clothes should be weighed for washing, as this standardizes the size of the wash, overcoming the waste of running with too small load or of overloading with resultant poor work. Washing in nets makes it possible to carry several small lots as one load. To a standard amount of clothes may be added a standard amount of soap, ample but not excessive. Commercial laundrymen have at all times done more toward economy and standardization than have most institutions. It is possible to standardize the size of the wash for each machine by having an electric bell on the scale. When the required weight is placed on the scale, the bell is rung by the pressure of the balance lever; and an employee, if unable to read and write, has but to follow the signal. A washer is well balanced with water and clothes if the water rises about one inch above the clothes when they are pressed down with the hand. The following list of a number of garments, their individual weight and the number of garments to every hundred pounds of load may be a help. In studying this list it should be remembered that both weight and count may vary so that a standard cannot be permanently established. However, they may serve as fair guides.

Article	Approx. Weight per piece	Approx. No. of pieces to 100 lb.
Sheets	1 lb. 5 oz.	76
Towels	2½ oz.	640
Pillow slips	3¼ oz.	492
Bed spreads	2 lb.	50
Gowns (hospital)	1 lb.	100
Diapers	2½ oz.	640
Dresses	1 lb. 4 oz.	80
Pajamas	5 oz.	320
Underskirts	6½ oz.	231
Wash cloths	2½ oz.	640
Socks and stockings	1 1/9 oz.	1440
Blankets	4 lb.	25
Napkins	1 oz.	1600
Tablecloths	1 lb.	100

(Courtesy of Laundrymen's Ass'n.)

In standardizing the work, especially at the wash wheel, it is well to have wash formulas printed in English and in the language of the worker. These printed rules can be covered with mica and protected from steam and dirt. These rules help to ward off discussions among untrained employees. They should not hinder trained employees from improving the work through experiment and investigation.

METHOD.—Cold water is run into the machine, and the clothes added; the five to ten minutes of revolving in cold water equal the overnight soaking in the home method. Dissolved soda is added to the cold water, as it saponifies the grease and loosens the dirt. Soda in the cold water has special value in washing table linen with its grease spots, or very soiled garments where the soil is held in by and combined with grease. The grease in the clothing is saponified by the soda, and is then dissolved in the water in the form of soap suds. (See pp. 53, 98, 125.)

Washing.—The cold water is run off, and hot water run in. To this is added soap solution. To one hundred and fifty pounds of clothes, use about six to eight quarts of soap (Fig. 33). Ten to fifteen minutes in suds will do the washing. A second suds may be necessary if the wash did not have the cold soak, and more especially if no soda was used in the water to saponify the grease. If boiling is done, it is accomplished by allowing the live steam to enter the lower part of the machine with the cage revolving. Clothes are better washed if the steam for boiling is introduced into clean soap suds rather than into the first suds.

To Overcome Lime Soap.—Lime soap is easily overcome if one has a water softener device. Otherwise the only way to soften water and to break the globular kind of scum that forms when soap is used in water which contains lime is by the use of soap or soda. Soap or soda will cause the water to "break" when sufficient has been used to overcome the mineral matter which is the ingredient of the hard water. Water that easily forms suds is known as soft water. If lime soap scum has formed, warm up the wash, add more soap until enough has been used to overcome the scum. Kerosene can be added to such a wash, and the heavy, sticky deposit will be easily dissolved, leaving no chance for scum streaks.

Boiling.—The question of boiling clothes in the institution is one which introduces several points of discussion. Actually to boil clothes renders them sterile, and satisfies a popular demand;

but to balance this advantage comes the fact that in course of time cotton and linen fibers will be deteriorated by the repeated boiling. Boiling in soap suds means that the alkalinity of soap solution may increase the injurious effect of boiling. With the thought of saving the fabric, the best way is to run a wash for ten minutes at 180° F., letting this amount of heat and the alkalinity of the soda and of the soap act as combined sterilizers; the heat of the ironing will complete the sterilizing process. For ordinary clothes this sterilization meets all requirements. Those garments which need special disinfecting do not go to the laundry, but are taken from the patient directly to special sterilizing machines, which wash and disinfect them. (See p. 295.)

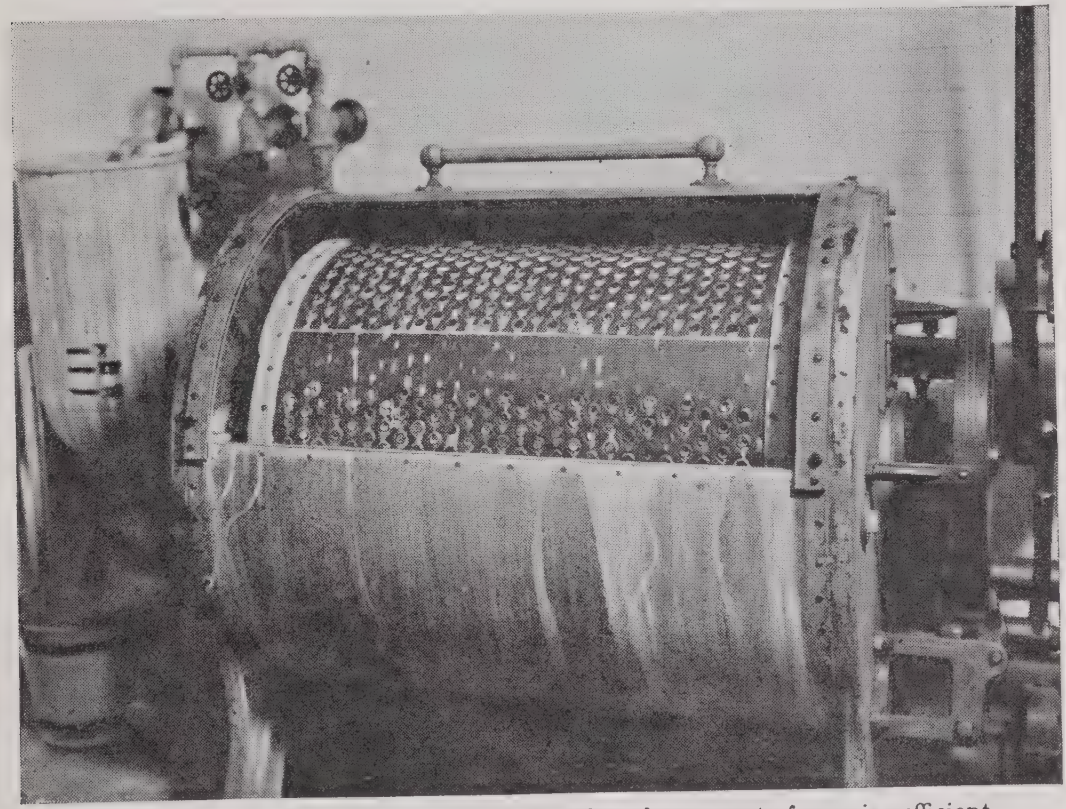


FIG. 33.—Washer "running suds," showing that the amount of soap is sufficient, without waste.

Bleaching.—If bleaching is to be done, it is done after the first suds, because clothes are best bleached when clean. Six to eight ounces of bleaching solution are added to about fifty pounds of clothes. For general use Javelle water, or chloride of lime and soda bleach, is used. (See p. 29.) A bleach is more or less destructive to fiber and should be expected to take out color. A bleach that would be successful for cottons and linens would be very likely to yellow, if not seriously weaken, silks and wools. (See p. 20.) The temperature is raised to 180° F. by turning on the steam, and is held at that point because boiling in a bleaching solution is destructive to fabrics. Equally good bleaching results, with less destruction of the fiber, at a lower temperature, if the garments are allowed to remain in the bleaching solution for a little longer time than would be allowed at boiling temperature. To remove all odor of bleach, this process should be followed by washing in soap suds. The second suds is followed by two hot rinses, two cold rinses and then bluing.

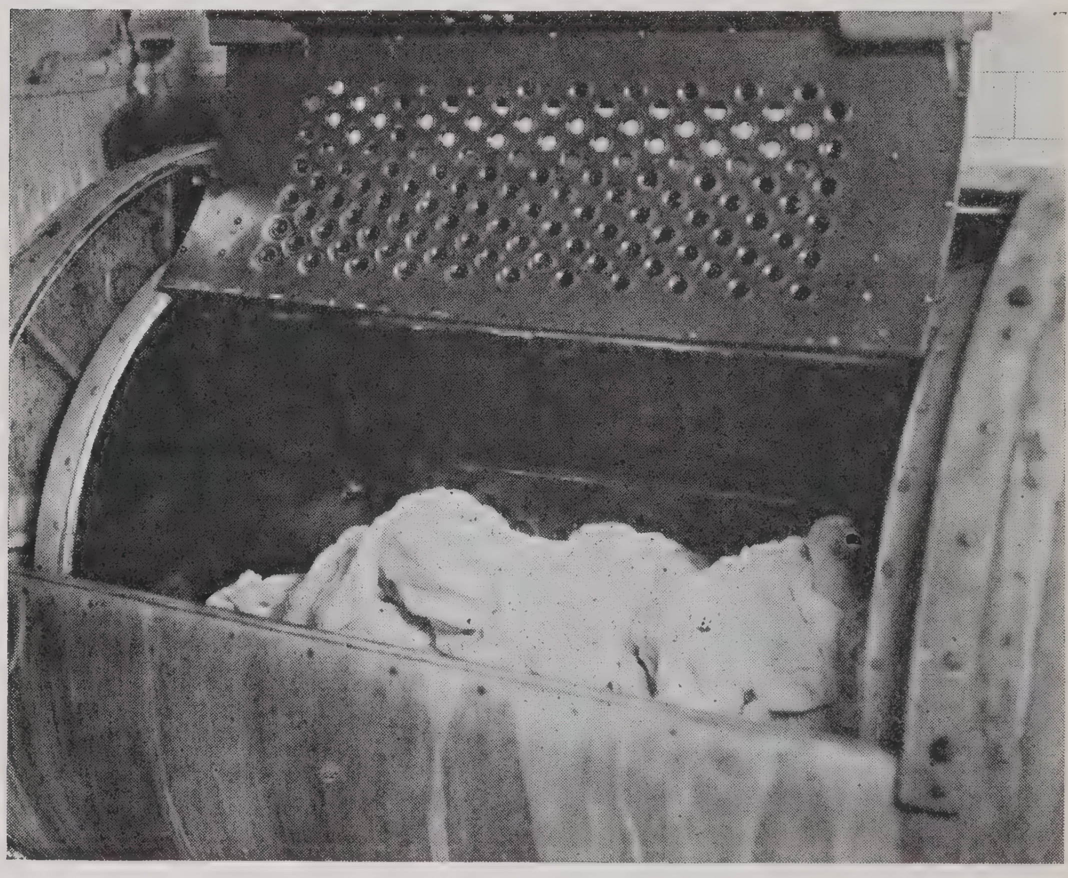
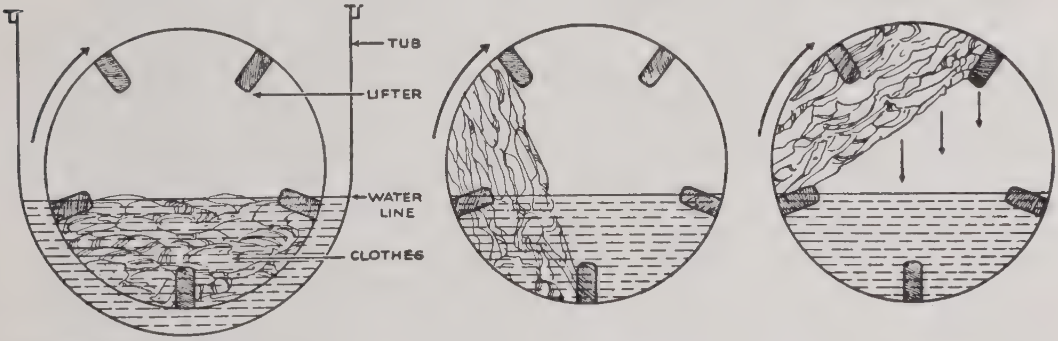


FIG. 34.—Washer open, showing washed clothes ready for extraction.

Clothes that are well washed and well rinsed each time should not need to be bleached regularly.

Rinsing.—Empty the machine and refill it for the first hot rinse. Steam can be introduced to raise the temperature of the rinse water if there is not available a plentiful supply of hot water. If a neutral soap is used, two hot rinses and two cold rinses may be all that are necessary to make the last rinse water clean and free from alkali. But if the amount of alkali is increased through the use of cheap soap, of washing powder, or of soda for a "break," then the number of hot rinses must be increased. The rinse water can be tested for alkali with phenolphthalein. (See p. 105.) The test should be made before the first cold rinse, because the alkali—in the form of carbonates—reacts more readily in the presence of heat. An observant worker will soon realize that an open drain is a good aid to the securing of clean clothes, since it is easy to check up the clearness of the water as it comes from the washer.

All the washing is now done with a smaller amount of water than used to be considered necessary (Fig. 35). The low water wash permits, or rather forces, the clothes to drop on each revolution of the cage or cylinder. This drop causes a pounding, which in turn produces a displacement of the dirt. The low water wash cleans the clothes faster, uses less water, and correspondingly less soap. It should be used in all cases except in washing woolens and in bluing white clothes. It produces too much friction for woolens, and may allow the clothes to streak in the blue. If one inch in the cage was the amount of water used for washing, use two or three inches for bluing.



(Redrawn from the Modern Laundry)

FIG. 35.—Diagrammatic drawing of a rotary washer showing the water line, when the machine is at rest, and the position of clothes at successive stages of the rotating action. Note the space allowed for the "drop" of the clothes.

Bluing.—The clothes should be well rinsed to be free from all dirt and all soap before any bluing water is put into the washer. The secret of good bluing is to have enough water to float the clothes freely and to have a light-colored blue, which, after three to five minutes, has been used up, giving the clothes a delicate tint.

Mix the bluing in a pail of cold water, using for two hundred pounds of clothes about two ounces of prepared bluing in a six or eight quart pail of water; stir it well. When the right amount of water has been put into the washer containing the clothes to be blued, pour into it the blue water. In most machines the cover of the outer cylinder must be lifted and the blue added on the down revolution of the inner cylinder or cage.

If the pail is drawn the length of the opening as the blue is poured, there will be no reason for streaks or for the clothes in one end of the washer getting more blue than those in the other. If blue is well proportioned, it will be taken up by the clothes, leaving no heavy blue water to be wasted by going down the drain. Thin fabrics will take more blue than will those of heavy close weave; the blue should, therefore, be proportioned to suit the fabrics to be treated. (See also *Bluing,* pp. 110, 113.)

Iron Rust Removal.—In laundries where many hundreds or thousands of pieces are done per week, it is an excellent plan to have all rust-stained garments held until a washer load has been collected; have two or three washings per month for cleaning the rust-stained clothes. The machine is prepared by running into the cage enough water to cover the bulk of clothes, which when dry would weigh, for example, about fifty pounds. For this amount of water prepare an acid water by adding six to eight ounces of hydrochloric acid to a half-pail of water. Add the acid water to that in the cage, by lowering the acid into the water without touching the metal part of the washer, then put in the stained clothing. Put the machine into action quickly, then turn on the steam to bring the temperature of the whole wash to 100° F. Run eight to ten minutes, but do not boil. Then empty with the machine in action, and follow with good soap suds. Soap suds are necessary to counteract the action of the acid on the clothing. Follow the suds with two hot rinses, one cold rinse, and bluing. Since the clothes were clean when treated with the acid wash, they do not need the thorough treatment given to soiled clothes; that is, the suds are used not to clean, but to neutralize the acid. After the treatment with suds, the clothes may go through the rinsing and bluing stages together with the regular wash. But they should never be thrown from the acid wash directly into the suds used for other clothes, as this would only subject the unstained garments to an unnecessary acid bath, and reduce the cleaning action of the suds.

Several prepared iron rust removers are sold by laundry-supply houses with special directions to help the worker. The machine method of removing iron rust stains is not possible for colored clothes, because, of course, the acid would affect the colors. The oxalic acid that is used as a bleach will also remove the iron rust.

Gauze and Bandages.—The washing of these dressings makes possible a great saving in hospitals, because there is a large quantity used, and washing and sterilizing makes it possible to use much of the material again. This material is washed separately from the regular laundry work. It may be cared for at some time when the washer would otherwise be idle, or a small washer might be installed to take care of such work as this. The extra washer would be an advantage, for the soiled dressings would not need to be kept waiting for a leisure period in the regular laundry schedule.

The dressings are put into nets, with little handling by the nurses, and are washed and dried in the nets. They are washed according to the regular wash formula, and are dried in the heated tumbler. The biggest part of the work is to untangle and re-roll the bandages. They are straightened, freed from ravelings, and re-rolled on special winding machines. The nurses in training may do this work, or if a convalescent ward patient desires something to do, he can help in this way. After the bandages are re-rolled, they are put into the sterilizer and sterilized.

Woolens.—The woolen garments in an institution are washed by hand, if small in amount, or in the machine if in large quantities, such as blankets and robes. In either case the methods given in Chapter XIV should be followed closely, for they apply to large quantities as well as to small ones.

WASHING BLANKETS.—To do good work in the washing machine, one must follow the general principles for washing woolens, but the manipulation will be modified. Prepare the suds by running the water into the machine and adding the soap before the blankets are put into the washer. To have the best results, be sure to have no leakage of water from the faucet, so the temperature of the water may be kept the same throughout all stages of the process. Establish the temperature of the water, run the machine a few seconds or long enough to have a good suds, and then put in the blankets. To avoid rubbing the wool, it is better to use more water than for the same bulk of any other fabric. Very soiled blankets will be less harmed by using two washes than by washing a longer time in one suds. Ammonia, borax, and alcohol will whiten blankets that are gray or grimy from over-soil. See recipe for *Blanket Wash,* p. 161.

To rinse or to change the wash water, stop the machine, lift out the blankets into the truck tub, letting as much water as possible drain off. Prepare a second water of the same temperature as the first and put the blankets back for the next process. Do this each time the change of water is made. Rinse the blankets free from soap, then place them in the extractor and extract until half dry. This can be well tested by watching the size of the stream of water as it flows from the drain of the extractor. It should be the size of the little finger. To over-extract a blanket will tend to pack and harden the fiber. Six blankets in a hundred-shirt washer are enough for a good load, as a larger number of blankets will rub on each other. For an institution a sixty per cent wool blanket will give the best results for the amount of wear it receives.

Special Cleaning.—As suggested above, all problems of special cleansing in the institution would be met in the same way as in the home. These articles may be cared for by the regular machine operators in slack periods. If there is any considerable quantity of this work, of course, it would be wise to have a special worker to care for it. (See Chapters XV, XVI, XVII.)

Suggestive Wash Formulas.—The following wash formulas are offered entirely as suggestions, because varying conditions in different localities have a definite influence upon the making of formulas. The hardness of the water, the supplies used, and the type of work done must be considered. So it is hoped that these suggestions will not be used unaltered, but that they may be the basis for experimental work leading to specialized formulas suitable to local conditions.

FAMILY WHITE WORK

Cold water—break	5 min.	
Discharge		
Cold water and soap	5 "	
Little steam	10 "	
Discharge		
Warm water and soap	20 "	
Steam 180° F.		
Discharge		
Hot rinses, 3	5 "	each
Cold water	5 "	
Discharge		
Cold water and blue	5 "	

To Bleach

Cold water—break	5 min.	
Discharge		
Cold water and soap	5 “	
Little steam	10 “	
Discharge		
Warm water	5 “	
Discharge		
Water and bleach	5 “	
Soap and steam, 180° F.	20 “	
Discharge		
Hot rinses, 3	5 “	each
Discharge		
Cold water	5 “	
Discharge		
Cold water and blue	5 “	

Colored Clothes

Cold water	5 “	
Discharge		
Cold water and soap	5 “	
Little steam	10 “	
Discharge		
Warm water and soap	20 “	
Discharge		
Warm water	5 “	
Discharge		
Two warm rinses	5 “	each
Cold water	5 “	
Discharge		
Cold water and blue	5 “	

Note: Keeping temperature of water low, netting clothes of like colors and shades help to prevent colors fading or bleeding.

Collars and Cuffs

Cold water—break	5 min.	
Discharge		
Cold water and soap	5 “	
Little steam	10 “	
Discharge		
Warm water	5 “	
Discharge		
Water and bleach	5 “	
Soap and steam, 180° F.	20 “	
Discharge		
Hot rinses, 3	5 “	each
Discharge		
Cold water	5 “	
Discharge		
Hot water with oxalic acid with steam	10 “	
Discharge		
Hot rinses, 2	5 “	each
Cold water and blue	5 “	

BED PILLOWS

Cold water—break	5	min.	
Discharge			
Cold water and soda	5	“	
Discharge			
Cold water and soap, little steam, 150° F.	15	min.	
Discharge			
Warm water	5	“	
Warm rinses, 2	5	“	each
Extract	12	“	
Dry tumbler	1	hour	

OVERALLS AND DIRTY WASH

Cold water—break	10	min.	
Discharge			
Cold water—break	5	“	
Discharge			
Cold water and soap	5	“	
Little steam	10	“	
Discharge			
Hot rinse	5	“	
Discharge			
Warm water and soap and soda, steam 180° F.	20	“	
Discharge			
Hot rinses, 2	5	“	each
Cold water	5	“	
Discharge			
Cold water and blue	5	“	

To Clean Washers.—Wooden washers require little cleaning, as the soda which is used in most wash formulas bleaches the wood and keeps it clean. Metallic washers are quickly covered with a scum. Continued collecting of this scum causes the openings in the inner cylinder partially to close, thus, to a certain extent, reducing the efficiency of the washer. This scum needs to be dissolved off, but this should not be done too often, as it is best done with an acid, which is somewhat injurious to the copper and brass of which the inner cylinder is made. The injury is slight for one time, but it is enough to warrant the cleaning of the washer only at regular intervals, perhaps once or twice in two months.

Citric, oxalic, sulphuric, or hydrochloric acid may be used for the cleaning. The least injurious, citric acid, is too expensive. Sulphuric acid will cost about half as much as the oxalic acid. For a two-hundred to two-hundred-fifty pound washer, use one pound of oxalic or citric acid crystals to about two inches of hot water in the cylinder. Dissolve the crystals in one-half pail of water. If a liquid acid is used in place of the crystals, use about one and one-fourth pint. Many prefer the hydrochloric acid because it is not very active on the metal cylinder and is especially active on the scum. Lime soap is readily soluble in this acid, but only partly soluble in the other acids. For purposes of cleaning one can use hydrochloric acid that is not chemically pure.

With the door of the cage open, run in enough hot water just to cover the bottom of the inner cylinder. Into this water pour the diluted acid, then close the cage and quickly set the machine in action. Let it run for five to ten minutes until the cylinder clears. Discharge the acid water and then give several hot rinsings to be sure that no acid remains in the washer to injure it or the clothes. In cases where the scum is very heavy, a stiff old broom will assist in the cleaning (Fig. 36). Cut the straws about two inches below the sewing to make them sturdy, stiff and less likely to spray acid. This is one good use for old brooms. For economy, the acid used to take out iron rust at various times may be saved and used for this purpose; it will clean the cylinder if the washer is allowed to run a somewhat longer time than is necessary with the method above.

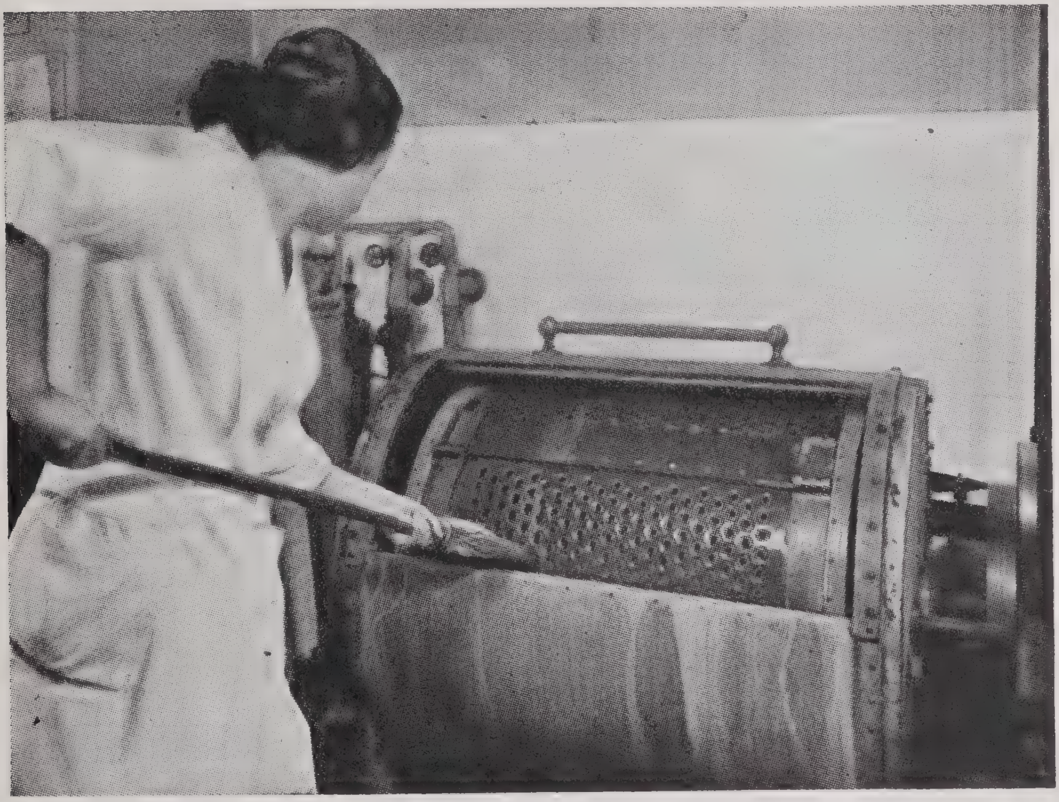


Fig. 36.—Cleaning the washer. Shows method of using broom.

The reason that the acid is not introduced undiluted into the washer is because it is so strong that it affects the metal—in fact, strong acid will produce an almost permanent stain on the metal.

Extracting.—The work of extracting, if well done, plays a most essential part in the laundry. The extractor, a powerful centrifugal drying machine, is constructed with a rotating, spheroidal basket within a metal jacket; the basket, which holds the wet clothes, is perforated to permit the escape of the water. When this basket revolves rapidly, the water is thrown from the center outwards, by which process sufficient moisture is eliminated to make the clothes dry enough for ironing.

LOADING EXTRACTORS.—In loading extractors, the heavy pieces, such as spreads and bath towels, should, whenever possible, be placed at the bottom of the basket. Place the goods in the basket in wads rather than in bundles, and pack them tight up against each other. See that the ends of each piece or wad are entirely in the basket; that is, do not have loose ends hanging out to become entangled in the machinery. Move the basket around and press the linen against the sides. By loading in this way no part of the garments will be left across the center or pivot, and the chance of having linen torn or split, as the extractor gains speed, is entirely eliminated. It is possible to buy a cone-shaped metal piece that may be put into the center of the extractor. This prevents the garments from crossing the center and being pulled in opposite directions. If the clothes are not lumped or wadded as they are put into the cage, or in some such way kept from spreading, the stray end of a sheet or cloth in one bundle is held down by the weight of the bundle adjoining or opposite in the cage or basket. As the basket gains in speed, the same power that draws the water to the outside of the extractor also draws the garment to the sides of the basket and stretches it as tight as a drum-head, often splitting it. Sleeves, for example, if not tied, should be folded into the garment and bunched with it. Never pack an extractor so full that it is over the rim or "curb" of the inner cage (Fig. 37). Besides, a good packer can always feel the bottom center of the basket as he continues to pack. Load the extractor basket flush with the top, then cover it with a round canvas three inches larger than the top of the basket, carefully tucking in all edges. Covers keep out dirt and hold the clothes in place, preventing loose ends from flying out as the speed increases. Start the machine slowly.

Never hold the hand on the extractor after it has started, or touch it while it is in motion. Neglect of this precaution may result in the loss of a hand. See that it runs evenly and does not wabble.

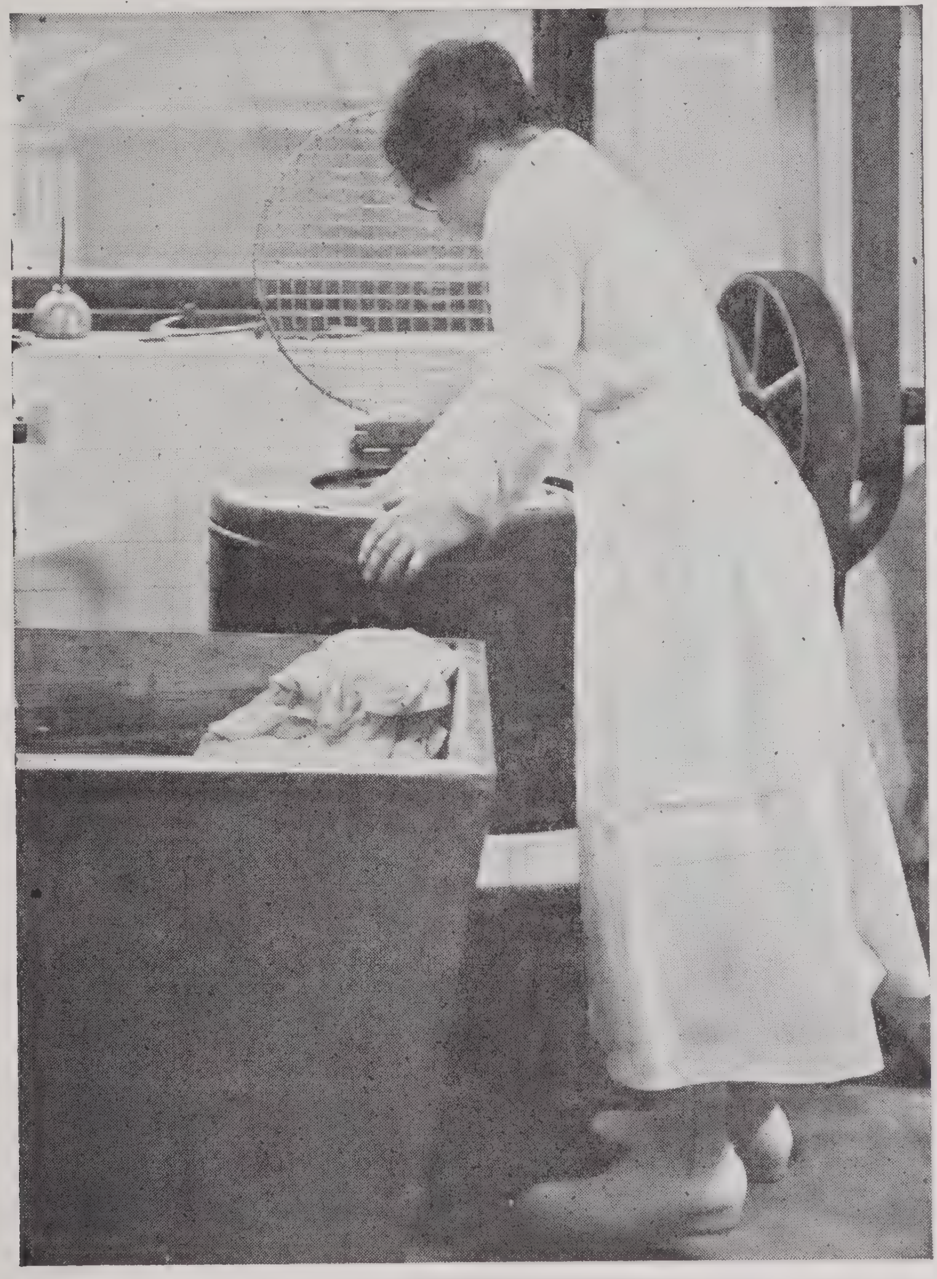


Fig. 37.—Packing the extractor.

This shows even loading, which is most necessary to avoid danger of strain on the extractor pivot. (See pp. 272, 305.)

Time for Extracting.—Three to five minutes for table linen is long enough to dry it sufficiently, and at the same time to leave enough moisture in the fabric to make the linen, when ironed, have the appearance of being glazed. Linen that is really linen, or half linen, will need no other finish. Over-extraction of table linen makes such heavy creases that it is difficult to remove them in the ironing. It is according to the same principle that the wringer must have less pressure for wringing table linen than for other clothing. Pillow slips, counterpanes, and garments whose fabric holds water should have longer extracting, so as to carry no excess moisture to the ironing machines.

Some extractors are equipped with time-regulating dials for different classes of work. Without the dial, good regulation of moisture is possible by watching the drip from an open drain of the extractor. Collars and all starch work should run until not a drop falls from the drain. For flat work a drip by drops is a good degree of moisture for satisfactory ironing.

Starching.—See Chapter IX.

Tumbling.—For a long time a tumbler has been used to "tumble" or loosen the clothes which come from the extractor in hard-packed bundles. It is an extra machine to buy, and plan space for, but it is a saver both of time and of workers. To open these bundles by hand, and to pull out the heavily creased folds, is hard work and slow, besides being done poorly. Too often the shakers merely loosen the bundle without taking time to shape the garments. When the tumbler is used to do the preliminary loosening, the shakers can give their attention to the shaping. The first tumblers were wooden-slat cages, unheated. The wads of clothes were put directly into the tumbler from the extractor, and in about three to five minutes the clothes had been tossed sufficiently to be loose and ready for shaping by the operator, when the garment was ready for the next process. In the last ten years the steam-heated tumbler has become so efficient as to be called a necessity. (See also p. 277.) Blankets, wrappers, underwear, bath robes are dried as they are tossed and when finished are soft and fluffy. Pillows may be done in large quantities in the laundry, because the heated tumbler produces dry, fluffy feathers, yet does not over-dry or scorch them, since the source of heat is not in direct contact with the pillows.

In small institutions where large and expensive equipment is out of the question, the washer may serve a double purpose; the cage of the washer may be dried, and, with the door of the outer cylinder open, the pillows and blankets can be tossed until well shaken and fluffed. This is a makeshift which does better work than is credited to it. Of course, its one hindrance is that it makes it impossible to use the washer as such when it is being used as a tumbler. With planning, this difficulty can be overcome by doing pillows and heavy garments when the washer would otherwise be idle.

Shaking.—So much saving of time in the ironing and in the appearance of linen after the ironing depends on the shaking of the garments to make them ready for the ironing machines (Fig. 38). The shakers should shake and stretch and turn each sheet, towel, or napkin so that it is ready for feeding into the machines. The flat pieces are stacked with hem upon hem and selvage upon selvage, and are always placed in piles with the same side down. The piles are usually stacked on tables, but the most efficient way is to have them on racks close behind the workers who feed the linen into the machine. If the linen is not stacked in these large piles, it is apt to dry quickly, so the stacks of linen act as retainers of moisture in the same way as the rolls of linen do in the home. If the machine has once turned back the selvages, it is very likely that those selvages will remain doubled through later washings and ironings. This will soon cause the material to cut and tear.

Expert shakers and ironers establish efficiency processes which reduce time and motion most perceptibly. One instance is turning the end of a towel back five to eight inches as it goes to the stack for the ironer. Sheets are folded in half crosswise, with the one hem turned back like the towel, about eight inches. This does much to shorten the time of feeding, because the worker needs neither to feel nor to hunt for the hem end. All sheets and towels should be stacked with the same side down to avoid the necessity of turning the garment as it is fed into the machine. The machine irons the side which is down and this should be the right side.

Piece work is an efficiency whip in the factory, and is common in commercial laundries, but not in institutional laundries. Shaking is not considered piece work in the laundry, but ironing is in many cases, and when workers are paid by the piece, they soon develop all the short cuts that are possible. Short cuts need not mean poor workmanship, because the best efforts result in first-class products.

Flat-Work Ironing.—Except on the small home ironer, this work requires one or two workers on each side of the machine as

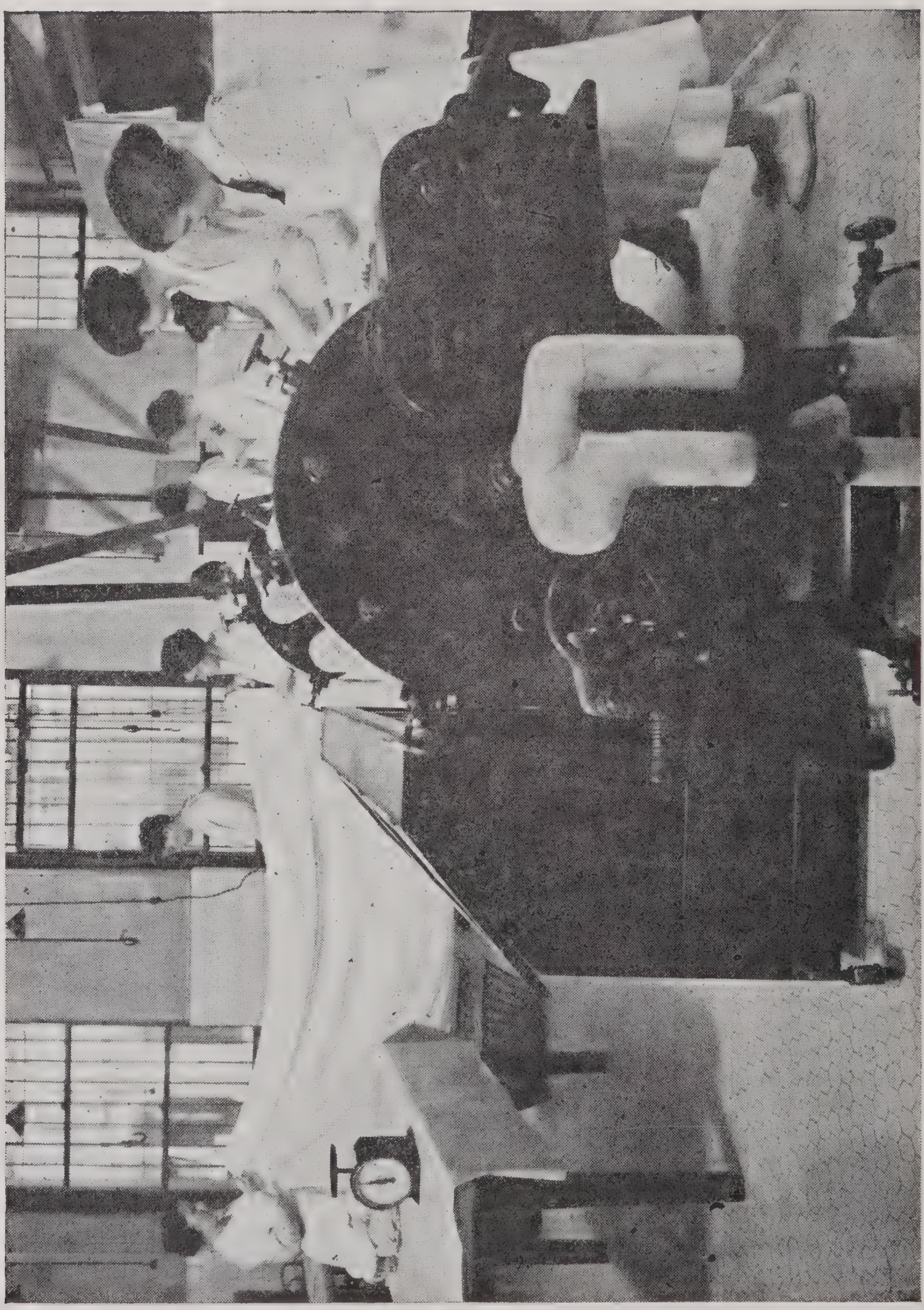


Fig. 38.—Good shaking, which saves the linen and aids in good ironing.

feeders and receivers. Ironing machines for institutions range in width from seventy-eight to one hundred and ten inches. The efficiency of the ironing process depends upon the rate of speed at which the machine is operated, the amount of steam needed to heat the cylinders, the cleanliness and evenness of pads, and the degree of extraction preceding the ironing. The large ironers despatch work with great speed, because they are so wide that sheets can be ironed without being folded, and because several small pieces may be fed side by side at one time, or on the left-over end of the rolls as sheets are being ironed. The machine should be hot, the pressure equal all along the rolls, and the pads and feed ribbons clean. The large ironers have a speed control device. This allows slow passing of the heavy or double garments, for instance, pillow slips, and then it may be shifted to fast speed for a sheet or napkin. (See also pp. 282-284.)

Method of Work.—The workers should start the work straight by pulling the hem taut. The hems are laid on the feed ribbon, and then held until the roll receives them. If this is not done, the corners will turn back, and the garment will be finished in poor manner. Those who feed should constantly stretch the garment in width with one hand and with the free hand press out the selvage. One hand of the worker does the feeding and one the shaping. There is much waste if the linen is not fed economically; that is, so fed that there are no large spaces on the feed ribbon not carrying unironed material. Fig. 39 will serve to illustrate this point very clearly. The work of feeding small pieces, especially if of double thickness, as pillow slips, is greatly facilitated by the speed control device mentioned above, and discussed further on p. 284. One person may feed any small garment, the width of which does not exceed the stretch of the worker's arms. Small pieces, like handkerchiefs, that often stick to the rolls and are carried into the machine, can be rescued by feeding in a heavy towel. The small, fine piece usually rolls out on the heavier fabric.

Many ironing machines have a canvas or metal trough to hold the ends of the large pieces that are being fed; if not, two baskets may be put end to end on the floor as protection against the soil of the floor. A new device to work with the ironer is a rack with rods which holds the folded linen as if it were on tables. These rods are slipped up into empty spaces, bringing the damp linen to the ironer each time (See Fig. 143).

If the good appearance of the linen is the prime thought, the linen should be ironed on both sides by being turned and fed through the machine a second time. Some ironers have an extra auxiliary inverted heated roll which gives a finish to the reverse side before the garment leaves the machine. May it be suggested here that machine ironing may be so quickly, and at the same time so well done, that there is no reason for the poor work sent out from many laundries.

Circles, ovals, fringe, and scallops, together with embroidered letters, can be ironed on the machine, if the worker uses care. Two bad results cannot be overcome—the fringe will look very stiff and pressed, and the scallops will turn under, unless each one is pressed out. What is more harmful, after several ironings, is the heavy pressure of the rolls of the ironer, which, as it comes from the thin part of the doily or centerpiece to the double thickness of the buttonhole edge of the scallop, will crowd the stitching, and in time a small hole will come at the point where the two scallops join.

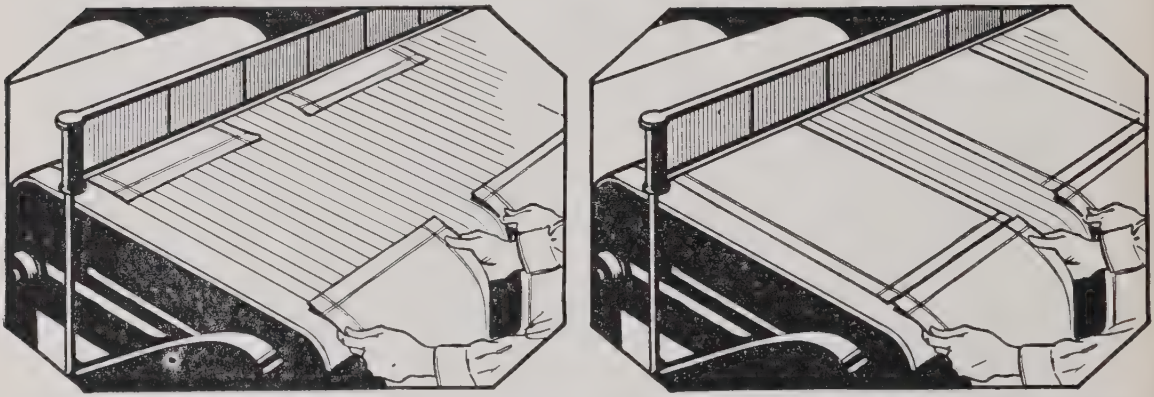


Fig. 39.—Diagram, showing wasteful and economical ways of feeding the ironer. This drawing also shows clearly the safety gate which protects the worker from accident.

If one plans to iron by machine, so much wear and tear as well as waste of time can be eliminated by choosing a pattern or finish that may escape these difficulties. Fringe has long ago proved itself most expensive in time and waste, and drawn work needs much special care because half the strength of the linen has been drawn from it with the threads cut or pulled. Hemstitching, if very narrow, will wear better than drawn work, but it, too, will tear out long before the garment may be considered beyond use, or even beyond its good looks. For institutions one of the most satisfactory edges for scarfs and tray cloths is the plain buttonhole or picot edge, done in heavy thread without padding.

When the ironer is not in use, the pressure should be loosened to save the rolls. The constant pressure makes the padding flatten and lose its spring, and the prolonged contact with the heated cylinder will soon scorch the canvas or muslin covers. Do not put on pressure until ready to iron, and reduce it when the ironer is not to be used for a time. Ten minutes before closing time, whether at noon or night, the steam should be turned off, as the ironer will remain hot that long.

Pressure of Rolls.—Should the sheets and table cloths come from the ironer so pulled that the corners are drawn beyond the hem line, it is a positive proof that one of two conditions exists. Either the piece was not started straight, or the rolls are of uneven pressure. Uneven pressure may mean that the rolls are not screwed equally at opposite ends, or that the padding on one roll is heavier and thicker than on the other. The set screws often become unequal in pressure when a new cover is put on, unless care is taken to count the number of turns of the screw. To make it more accurate, note the number of turns used to loosen the screws; then it will be easier to get the pressure right without so much testing. Where the padding is heavier, that part of the roll is larger. Continued ironing without even pressure will cause the cloth covers of the rolls to push out farther at one end than at the other, until finally the strain will cause a bias tear, drawing the threads for a width of three or four inches.

Not only will uneven pressure cause pulling of the sheet, but it may also cause it to plait. If one roll of the ironer is smaller than the others working beside it, or presses on the steel roll less tightly than the others, it will allow the sheet to feed more freely than will the others. This surplus material will often plait before the next roll can take care of it.

The usual way to test the evenness of pressure, one roll on another, is by a folded paper. With the machine in action, wedge the paper between the heated steel roll and the cloth rolls at several points, and note the comparative resistance. The paper must be inserted and withdrawn quickly, to prevent its being caught and drawn into the machine, from which it can be extracted only with difficulty and hindrance to the work. This test should prove the pressure of all cloth rolls on the heated steel roll to be equal. The size of the rolls may be tested by means of a diameter measure, such as is furnished by the laundry machine manufacturer. If the ironer has been correctly padded, this measure will indicate the same circumference along the entire length of the roll, and the same for every other roll.

The rolls should be tested each time they are recovered, and workers should be impressed with the necessity of having even, carefully adjusted pads. A little extra time spent in careful padding will save much waste and will insure straight, well-ironed garments.

Collar and Cuff Ironing.—The ironing of collars, cuffs, and bosoms is done by special machines, described in Chapter XXII. The collar-and-cuff machines are like small presses, on which the cuff or collar is placed and then the machine is operated exactly as a bosom press. Usually the presses are used when the collar and cuff is attached to the garment, making it easy to adjust and shape the collar and cuff or perhaps the neckband. As the revolving ironers are really flat-work ironers, the collars and cuffs are put through flat, under pressure. The processes in collar-and-cuff work are so varied, from the starching of the collar to its ironing and finishing, that many machines are necessary and a great expense involved. It is wise to consider this in a small institution and perhaps send out the collars per week on contract. The question as to whether it pays to do this work in an institution depends upon the amount of it to be done as well as upon the amount of special equipment that can be afforded for the purpose.

Ironing of Body Clothes.—The body ironer is either a machine which irons by rolling a section of the garment between a padded, cloth-covered roll and a heated metal roll, or a press which irons by steam heat with the garment under pressure (pp. 285-286). The body ironers are made in all sizes from those with rolls long enough to iron a shirt cuff to those that will carry the length of a dress skirt or petticoat. The machine is not constructed to do gathers, so about five to six inches of the skirt must be left to be done by hand. These ironers are gas-heated, while the presses are heated by steam. In using a press, the garment is placed in shape on the padded board, which is brought into contact with a metal shoe, and the steam dries the garment while it is under pressure. The same general rule must be used with ironing on presses as with flat-work ironers—shape the garment with the grain of the goods, and iron it until it is dry. These presses were first used for collars, cuffs and shirts, and proved so successful that most of the work is done that way. The presses are built so one operator may manipulate two or three presses by operating in rotation one machine after another.

The body ironer, in comparison, requires constant attention on the part of the operator, and the work is hard because of the confined standing position required, and the heavy foot pressure needed to shift the action and to bring the rolls together for ironing.

The development of flat-work ironers has advanced so rapidly that some of them are prepared to iron body clothes as well as sheets and tablecloths, thus eliminating the necessity of having so many specialized types of ironers. (See p. 284.) This improvement has made family work on the flat-work machine very practical if such work is to be done at low cost rather than with special finish.

To Re-felt Ironers and Presses.—The felts may be washed like a blanket in soapy water of moderate temperature; a mild soap should be used. (See Chapter XIV.) A ferment may be used to digest the paste that was used to fasten the felt to the ironer. This is added to the water in which the felts are soaked before being washed. After being washed the felts should be stretched into shape and hung in the drier. This shaping is most necessary to prevent the felts from being too short and too wide when dry.

If the felts are clean and need only re-felting, steaming will be sufficient to renew them. Place the felts without water in the washer. With the washing machine in action turn on the steam and let the felt have five to ten minutes of steaming. At the end of this time the felt will be soft and fluffy. After the felts are shaped and dried, replace them on the ironers.

To replace a felt on a flat-work ironer, fasten the first edge with paste. This paste may be a special mixture, but a flour-and-water paste will be found just as satisfactory. Mix the flour and water to a thin batter consistency. Coöperation with the institution kitchen may be effected by using for this purpose any old, musty flour that would otherwise be a source of loss. However, even good flour is not too expensive because it is not necessary to use a large amount. Start the edge of the felt under the roll of the machine, and with a knife or back of a spoon, or with a paint brush about two inches wide, spread the paste along the upper edge of the felt. This places the paste where it is ready to adhere to the felt which is brought up to meet it. One person starts the machine, while one or two others—depending on the width of the roll—hold the felt, resisting the machine while it winds the felt around the roll. The felt on a press is sprung into place by means of a frame-like spring.

To Change Covers.—Muslin or canvas covers will need cleaning more frequently than any of the felts, because they get the direct wear. Soiled covers will produce soiled clothing. The scorch, if not very heavy, will wash out, leaving the cover almost like new; also the life of the cover will be lengthened.

Usually covers are changed once a week, on whatever day the plan of work allows free time. Many institutions close Saturday noon as soon as the work is finished; then the muslin or canvas covers are taken from the ironers and washed. They may be put on by the workers on Monday morning while the clothes are being washed. The covers of the smaller machines are cleaned in the same way, and usually at the same time. However, the thought of a regular day for this work must be laid aside if the covers need changing before that time.

Clean canvas or muslin covers are not fastened on the ironers with a paste as is the felt. They are cut about three or four inches wider than the felt, so that there will be muslin enough to tuck in around the felt after the covers are put on. The end is laid under the last six inches of the felting, and the machine is started. This winds the muslin tightly about the roll. If the muslin is damp when it is put on, it will roll more smoothly, and the heat will soon dry it. There should be even and firm resistance on the part of the persons holding the muslin. If the pressure is on the flat work and body ironers when the muslin is replaced, the covers will be smoother, freer from wrinkles, and straighter.

Muslin covers for the presses are sprung on in the same way as the felts.

Questions

1. In what way would it be practical to establish knowledge concerning the life of flat-work linen?
2. By what checking-off system do you account for loss?
3. How far have you proven that colored and white clothes may be washed together?
4. To what extent is it justifiable to standardize a wash formula?
5. What practical tests have you proven that will answer the following questions: Which is the greater economy, a second suds or a "break"? Why? Can you prove by cost?
6. In what ways can the cost of bleach be reduced? When is bleach justifiable?
7. What rules for operating an extractor should be listed and placed near the machine?
8. Problem: Given a flat-work ironer that finishes the clothing by sending it through on the bias and plaited, how would you proceed to straighten and readjust the machine for smooth feeding?

CHAPTER VII

SOAP

Soap is considered today as an essential in every civilized community. Someone has said that the civilization of a country is known by its soap bill. Soap, in some form, has been made for centuries, but like so many other products, it has had its most rapid development within recent years. For many years home-made soap, or "soft" soap, was the mainstay of the household. It was of such uncertain quality, however, that it gradually gave way to more scientifically made "hard" soaps. Now we demand more of the best soap than mere power to make soapsuds. It must be not only a cleanser, but also a disinfectant.

As a cleanser, soap dissociates in water and forms suds, which in turn act as an agent to carry off the dirt. This dirt is most often held in by greasy matter, which is attacked and saponified by the alkali set free in the decomposition of the soap. The chemical action of soap in cleaning, however, is not as important as the physical action, especially its rapid absorption.

As a disinfectant, soap is used in hospitals to sterilize hands and instruments; in laundries, to sterilize clothes; for toilet purposes, to sterilize skin and hair; in homes, for dishes, refrigerators, and all general cleaning. An experiment, of special interest in connection with the problem of the wet-wash laundry, was performed at Milbank Laundry, New York City, for the purpose of testing the disinfecting power of soap. Filthy clothes were inoculated, and all conditions were made favorable for the growth of the germs. After a time, two hundred and forty pounds of the clothes were washed in one machine, by a good wash formula. After the washing was completed, the clothes were tested. They were found to be entirely sterile.

Quality.—The required ingredients for soap are fat and alkali (soda or potash), so that the quality of a soap depends on the cleanliness of its fat ingredient and upon the proportion of fat and alkali. The kind and amount of foreign material will also materially affect the quality of the soap. The *fats* used in soap come from animal and vegetable sources. The vegetable fats, making a milder soap, are most often used for toilet soaps. Animal fat makes a harder soap than does vegetable fat, because its melting point is higher. This is a point to remember when buying a soap. If it is to be used with water of very high temperature, it is probably better to buy a soap made from animal fat. Cheap laundry and toilet soaps are made from animal fats, or from animal and vegetable fats mixed. Home-made laundry soap is often made from kitchen grease, which is a mixture of many kinds of fat, and therefore of rather uncertain quality. The fat, of whatever origin, must be clean if good soap is to be made.

The *alkali* may be either of two kinds—soda or potash. Soda makes a hard soap, potash a soft soap. The wood ashes, often used in making soap at home, are of a potash nature. The proportion of fat and alkali determine the strength of a soap. A "neutral" soap is one in which the fat and alkali balance, so that there is no excess of either. Since the alkali is cheaper than the fat, it is most often added in excess to increase the margin of profit to the manufacturer. Therefore, when one buys soap, she should be sure she is paying for soap, not alkali. (See *soda* below, also p. 125.)

Foreign material is a term which may be applied to all substances not necessary to the actual formation of soap. They may be added to soaps to increase weight, to aid in cleansing, for medicinal uses, or for esthetic reasons. If they have a real cleaning or medicinal value, then they add to the quality of the soap. But if they are added merely to increase weight or to hide poor quality ingredients, then they become adulterants, and represent poor bargains for the purchaser. The outline table on the opposite page gives a concise explanation of these materials.

If economy must rule in soap-making, one can use the kitchen grease and the leached wood ashes or lye of an uncertain composition. But if one is buying the ingredients, it pays to get the best, for soap of good quality soon pays for itself. And the same is true of commercial soaps. A poor soap is a source of waste not often suspected by the housewife. A pure, unadulterated soap will do twice the work of a poor soap, with less injury to the materials cleaned.

Weight Substances.—A certain amount of water—twelve to fourteen per cent—is good in a soap, as it keeps sufficiently soft to cause it to blend readily with the wash water, and consequently quickly and easily to make suds. Excess water makes soap soft, and may be an adulterant, if in very large quantities, for then it will add considerable weight. When soap is purchased by the cake,

- Kinds of Soap
  - Toilet .... Vegetable fats..
    - Palm oil..........
    - Olive oil..........
    - Cottonseed oil..
    - Coconut oil......
    - Maize oil ....
  - Laundry..
    - Animal fats......
      - Beef................
      - Pork................
      - Mutton ....
      - Mixture...........
    - Vegetable fats..
      - Coconut oil......
      - Cottonseed oil..
      - Olive oil..........
      - Palm oil..........
    - **Mixture**..........
      - Animal ....
      - Vegetable ....
      - Kitchen grease.
- +Alkali..
  - Soda— Hard soap.
  - Potash— Soft soap.
- +
  - Weighting............
    - **Rosin** ....
      - To increase suds
      - To add weight
    - Water ....To add weight
  - Extra cleanser.......
    - Borax, Sodium carbonate ......To soften water
    - Kerosene, Naphtha or benzine ....To remove dirt
  - Abrasive material..
    - Pumice, Sand ....To clean by scratching
  - Color and scent.....
    - Dye and foreign color
      - For esthetic reasons
      - To hide dirt
      - To hide rosin
    - Perfumes, Volatile oils ....
      - To hide rosin
      - To hide dirty fats
  - Medicinal agents...
    - Resorcin, oil, **tar, etc.,**
    - Carbolic acid
      - To treat skin
      - **To disinfect**

OUTLINE OF SOAP INGREDIENTS

the buyer pays little attention to the percentage of water in the soap, but when soap is bought by weight, as in an institution, it is very necessary that the percentage of water be within the limit—twelve to fourteen per cent. Small packages of soap weighing from six ounces to three pounds are purchasable by the package and may vary somewhat in weight, but when a barrel of soap is purchased, the weight should come to the required amount, about two hundred and fifty pounds.

Rosin, which is prepared from crude pine turpentine by distillation, is added to soaps because it produces a foam or false suds with water. It is also a weight adulterant. To a certain extent rosin may clean, but as the suds are sticky and gum-like, they naturally form gum layers on the boiler; and, should the suds not hold, but a scum form, the rosin will cause the scum to adhere to the clothes. Rosin will be found in all yellow laundry soaps, and may be detected by the odor, and by a sticky feeling when handled. (See also p. 105.)

Extra Cleansers.—These include soda, borax, ammonia, kerosene and naphtha. They are introduced into soaps to give an added cleansing power.

Soda, Borax and Ammonia are alkalies which may soften the water, thus increasing the suds, or may saponify (or cut) the grease, thereby setting it free. The saponified grease gives up the dirt it held, and allows it to float free. Soda is used in carbonate form (washing soda). It is somewhat hard on the hands and injurious to wools, silks and colors. It is better to buy a neutral soap and when desired add soda in liquid form. This is not only cheaper, but safer. (See also pp. 102, 105.) Sodium carbonate as an ingredient in soap may be qualitatively tested by these simple means:

> The soap buyer has a practical test for proving the presence of soda in soap. A flake of soap is held for a few seconds in the mouth. If soda is present in any special amounts, the soda will "bite" the tongue, as any caustic or strong alkali will do. A neutral soap is almost free from any taste.
>
> Excess alkali is roughly tested by litmus paper. Always test the center of a freshly cut cake of soap. Use red litmus paper moistened with clean water and see if it turns blue when brought into contact with the freshly cut soap surface.
>
> A more definite test is to shave one tablespoon of soap into a beaker or glass, and cover with alcohol, about one cup. Place beaker over water bath. (Note: A water bath

may be made with a large pan and a weight or ring in the bottom upon which to stand the beaker, or glass. Cover the glass to prevent evaporation of alcohol or a chance fire. Have a low fire under the alcohol so that there will be no danger of fire.) Heat slowly until all the soap is dissolved. Strain or pour through filter paper. All the pure soap will go through the paper with the alcohol. What remains is excess soda or foreign material. This alcohol test for soda in no way gives a test for rosin. Rosin is soluble in ether; but, because of the danger of fire, together with the exposure of the worker to ether fumes, this experiment cannot be done outside of the laboratory, where suitable apparatus is at hand. Such an experiment should be performed only by the advanced students who have good manipulation and experience.

Borax and ammonia are very mild alkalies, acting as bleaches which are harmless to fabrics. Both are grease solvents and neutralize acids. Borax has a special use in washing white woolens. (See p. 129.)

KEROSENE in soap loosens the dirt in the same way that kerosene in the boiler does. Good rinsing should follow to remove odor. The special value of kerosene is that it is a grease solvent, and a special cleanser for grease types of dirt, such as shoe polishes and vaseline.

BENZINE soaps are especially made for the professional work of spotting and cleaning fabrics, benzine being a grease solvent. In the absence of benzine soap, use any soap and clean benzine or gasoline as soap and water would be used. But keep these agents away from an open flame.

Sand and Pumice.—These are abrasive materials which clean by scratching. Soaps containing these ingredients are used for household cleaning rather than for laundering.

Medicine, Oils, and Disinfectants.—Agents such as resorcin, quinine, olive oil and carbolic acid, are used for bathing and disinfecting the scalp and for sore and delicate or diseased skin. Such soaps are especially used for hair treatment. Soaps containing carbolic derivatives are used for sterilizing purposes in hospitals.

Perfume and Color.—Both perfume and color should be accepted only in high quality soaps, as they may be used to cover up impurities in a cheap soap.

Soap-Making at Home.—As has been stated above, if the housewife wishes to make her own soap, it will pay her to buy the best ingredients she can afford. The following directions and recipes may be of help in producing a good-quality soap.

To Make Soda Solution:

I. 1 lb. caustic soda, chemically pure
6 pts. water

Dissolve the caustic soda in water. If this proportion is rightly measured, the soda will be of the correct strength—17° Beaumé—when tested with a Beaumé hydrometer, to be combined with pure, clean fat. Note: Caustic soda is sold by the pound. It is purchased in stick form and should always be handled with forceps so as not to burn the fingers. Keep the soda away from any metal like tin or iron.

II. 1 can lye
1 qt. water

This is a household recipe which produces good results, but the alkali is not of such pure quality.

To Prepare the Fat.—Melt it and let it cook slowly with water or raw potato until the fat no longer crackles. This means that the water has all evaporated and has deodorized the fat by its vaporizing and carrying off some of the odor.

While still warm, the fat should be strained through fine muslin (the usual household way), or through fine charcoal or clay. This latter is a slow process, but gives a whiter fat, hence a whiter soap.

To Make the Soap, use:

1 lb. clean fat, warmed
14 oz. soda or lye solution

Stir with an agate spoon or a stick until it has the consistency of honey, then mold.

Any coloring, perfume or extra cleansing material should be added as the soap is saponifying and before the molding consistency is reached.

To Mold.—Line an enamel pan or box with waxed paper, cutting the paper in strips, like the paper in candy boxes, so the corners will be smooth. Pour soap mixture into the container and let stand until well formed. Before it dries, remove the paper as one would from a warm cake.

Home-Made Soap in the Institution.—Many institutions feel it is a wise economy to make their own laundry soaps. This is questionable, because of the great irregularity of the fat, the amount of work required for rendering the fat, and the unpleasant odor. The cost of the equipment must also be taken into consideration. Special steam cookers are necessary to render the fat, and the soap cookers must be steam-jacketed. The equipment requires a special room; moreover, the work produces very unpleasant odors, which should be isolated from the laundry room. The fat must be fresh and clean. This is a place where the kitchen and laundry departments of an institution must coöperate for success. Many prefer to sell the kitchen grease, and use the money obtained by selling the grease towards buying the laundry soap. The commercial laundry man is much opposed to having soap made in the plant, because the soap is not standard. The following recipes presented by several hospitals may be of service for a home-made soap, using kitchen grease. The soap is steam cooked, and as soft soap may remain in the soap cooker.

I.	Grease	100 lbs.
	Caustic soda	20 lbs.
	Water	80 gals.
II.	Grease	34 lbs.
	Soda	22 lbs.
	Water	100 gals.
III.	Grease	90 lbs.
	Soda	30 lbs.
	Water	60 gals.

The lye or soda should be dissolved and added to the grease. About one-half the quantity of water should be boiled with the grease and soda solution until the whole mixture is of the consistency of honey (about three to five hours). Then add the rest of the water and set away for use.

It will be noted that the above recipes vary both in the proportion of soda to grease and in the amount of water. The amount of water is often determined by the size of the soap cooker. If this is small, the soap is sometimes made in concentrated form. It solidifies on cooling, and must be steamed up, or liquefied, before being used. Less of this soap would be used for a load of clothes, since it is so concentrated. The amount of soda varies according to the need for a stronger soap, depending partly upon the type of work to be done, and also upon the hardness of the water used. The alkali acts as a water softener, and varies in amount according to the differing degrees of hardness of water. Since hardness of water is not only a hindrance to good work, but an actual cost element, one must include this item in the estimate for alkali. If the laundry is equipped with a water softener, then of course the amount of alkali will be decreased.

Soap Solution for Boiling or for the Washing Machine:

Dissolve 1 lb. soap chips in 5 gals. of water; or
1 cake of soap in 4 qts. of water.

Dissolve by heating at a low temperature. The color should be amber and not dark. Overcooking soap makes the soap solution dark.

If the water is very hard or the clothes very soiled, one-half pound to one pound of washing soda (to each pound of soap) may be added to the soap solution when the soap is dissolved. Continue heating until all soda is dissolved. Soda "built in" to soap in this manner does little harm to any cotton or linen garment and is often not only a saver of soap where water is hard, but overcomes grease in table linen and the heavy soil in dirty garments like overalls. (See p. 103.)

Soap Substitutes.

Bran water	Recipes in Chapter XIII, page 157.
Potato water	
Starch water	
Soap bark water	

To Purchase Soap and Soda.—Soap may be purchased in the cake form, which is more economical for household cleaning and where the washboard is still used. With washing devices, such as the funnel in the wash boiler and all types of washing machines, a soap solution will save time and soap, because it instantly forms suds with the wash water. One will find both soap chips, or flakes, and soap powder on the market. The small six-ounce packages of flakes are too expensive for regular laundry use. Their special service is for the traveler or the person living in small quarters who wishes to wash out one or two small, delicate pieces of wearing apparel. In some of the grocery stores one may purchase three-pound packages of soap chips, but for real economy the soap should be bought in quarter-barrel, half- or whole-barrel quantities. Soap in no way deteriorates, and with a good cover may be kept ready for use at any time. Drying does not harm it for making soap solution.

The soap should be neutral, which means free from any excess of soda, either the caustic soda, which was used to change the grease to soap, or washing soda, which is used as an extra cleanser. (See p. 97.) In buying a neutral soap, one is purchasing a known medium, upon which one may build washing solutions to be used for various degrees of hardness of water and for various kinds of garments. It is an economy to buy neutral soap, because one is not paying for soda at soap rates.

To estimate soap for use in the laundry: allow one pound of chips to every one hundred pounds of dry clothes, with ten per cent extra allowance for loss.

Soap powder should mean a soap in powdered form, but usually it means a special "washing powder."

TO BUILD SODA INTO SOAP.—*Soda* which is intended especially for use in the laundry is called a "neutral" or modified soda. (See p. 125.) It is sold under various trade names. It is combined directly with soap solutions in the compounding of wash formulas. This modified soda does not affect the worker's hands, nor is it hard on delicate fibers. The proportion of soda to soap varies from one-half to two times as much soda as soap, depending upon the percentage of hardness of the water; the harder the water, the more soda is needed. The soda must always be mixed with the soap and water, or dissolved in water which is used as the water for soaking clothes. For a general idea of proportion, one may use the following recipe:

5 lbs. of soap
5 lbs. of soda
25 gals. of water

The capacity of the soap cooker gauges the amount of soap and soda to be used. Generally speaking, the ratio is one part of soap, one part soda and five parts water, the soda being decreased or increased according to the nature of the water, using care that soda is not in great excess. By excess we mean that the soda should not be more than is needed to soften the water and to produce good suds with the soap used. It is extravagant to use all soap, and harmful to fabrics to use all soda.

To Store Soap.—Soap, to be most efficient, should be neither so moist as to become soft and pasty as soon as wet, nor so dry as to need soaking before being used. In the first case too much soap is used, while in the latter case, the negligent worker is apt to let the soap float in the wash water. This constitutes waste. If one buys a box of cake soap, the best plan is to unwrap only the first lot, leaving wrapped the half to be used last. One method for quick drying is to stand the cakes on edge, and stack log-cabin fashion. All soap should be stored in a clean, dry place.

The question of proper storage of soap is of increased importance in the institution, where perhaps three months' supply is to be taken care of. The first essential is dryness, so that there may be no wastage from dissolved soap. If the container is raised

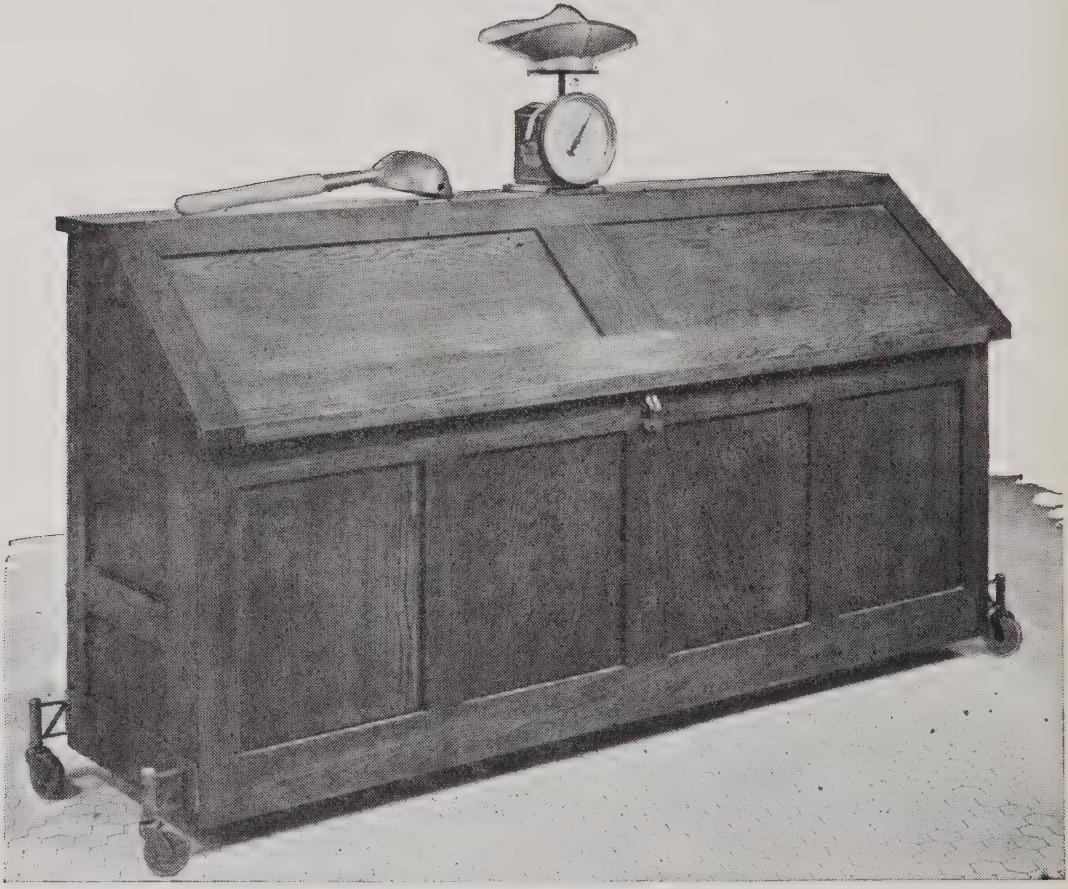


Fig. 40.—Storage chest for soap and soda.

from the floor by means of a wooden grating or platform, the soap will be less likely to become wet through careless handling of water. The second essential, of equal importance, is cleanliness. The soap must be stored in a place free from dust; there is no excuse for introducing any additional dirt into the wash water. The container must be kept covered. It is necessary that the supervisor be able to keep an absolute check on the amounts used. In many institutions the soap is kept in the barrels in which it is received. The same conditions of dryness and cleanliness are essential in the storage of soda. A special storage chest, with compartments for soap and soda, and with a good, impervious lining—preferably metal—and a hinged cover that may be locked, will be found very satisfactory (Fig 40). It not only meets the two essential requirements, but it also adds considerably to the general neatness and attractiveness of the laundry. Rollers or wheels will add much to the efficiency of the chest. The dimensions for such a chest, with a two-barrel capacity, as designed by Miss Clara Noyes, of Washington, D. C., are:

Length	74 in.	Depth	19 in.
Height, back	36 in.	Lid, slant	74 in. x 17½ in.
Height, front	24½ in.	Lid, top	74 in. x 7½ in.

Practical Tests for Buying Soap:

Weight I. Weigh cake of soap with wrappers
without wrappers } Note weights

Rosin II. Stickiness: Cut through middle of fresh cake
1. Feel as dry soap
2. Feel with moist finger
3. Apply litmus paper test for alkalinity

Alkali III. From clean shaving of soap test II
Taste for
1. Alkalinity—bites
2. Neutral soap—no taste

IV. Compare power to make suds
1. With hot water
2. With cold water
3. Soap with taste *vs.* without taste

V. Combine with III by washing cloth with
neutral soap
alkali soap } using water as hot as hand can stand—about 110° F.

Note: These five tests, used with a comparison study, should establish definite facts concerning the soap solution to use.

Chemical Test for Alkalinity

VI. 1. Shake a few shavings of the soap in corked t.t. and warm alcohol (95 per cent.).
2. Add few drops phenolphthalein to solution. Red color indicates free alkali.

VII. Test whole cake on fresh surface by few drops alcoholic phenolphthalein. Note color.

Cost VIII. Record weight of known amount of soap shavings
Spread on watch glass to dry
Weigh each day until weight is permanent } Note evaporation by reduction each day

Efficiency IX. Shave a half cake of above soap. Note time required.
Compare ease of
1. knife
2. grater
3 meat grinder

Efficiency, con't. X. Using time study of IX
    Prove efficiency of solvent power
        Use 2 qts. of cold water
        Use 2 qts. of hot water

Cost, time, labor XI. Compare cost of
    soap shavings
    chipped soap
    granulated soap

XII. Place 1 cup water in Mason jar No. 1
        1 cup water in Mason jar No. 2
    In jar No. 1 add soap solution IV (1)
    In jar No. 2 add soap solution IV (2)
        NOTE: Add soap little at a time, shake for suds, and when suds last five minutes after shaken, consider you have a good soap solution.
        Question: Which solution is best—for ease
            for cost
            for efficiency

NOTE: Label these two soap solutions so that you may distinguish and use for further experiments, especially with washing machines.

Questions

1. How does soap clean fabrics?
2. What are the arguments in favor of this statement: "The civilization of a nation is known by its soap bill"?
3. Why use a soap that is made of vegetable oils for a general washing machine soap?
4. To what extent do soap substitutes take the place of soap as cleansers?
5. To what extent is a soap a disinfectant?
6. What arguments may be presented in favor of purchasing soap by contract?
7. Problem: Make a study of (a) cake soaps, (b) soap powders, (c) soap chips, tabulating the results of such practical comparisons as would decide a soap rating which includes feel, odor, cost. Star your leading choice.

CHAPTER VIII

BLUES AND BLUING

Blues come from a vegetable, a mineral, or a chemical source. They are bought in either a liquid or solid form—balls, blocks, crystals, powders. Color tones of the different blues vary considerably, the chemical variety being a violet or blue blue, or greenish blue; the mineral, a blue blue; and the vegetable, a dull, dark blue. A comparison of the cost of different blues shows great range in initial cost, but study proves that price is not the only criterion, for some may be entirely soluble, while in others there is considerable waste material of a clay nature. This weights the blue, a hindrance when one buys blues by the pound. Clay is insoluble and heavy, and naturally settles quickly unless the blue water is constantly stirred. Such a blue, if without iron, is best used in soapsuds, for the suds will help to float the heavy blue particles.

Bluing is used to counteract the tendency of white clothes to yellow. This yellow tint may be from iron in the water, but is more often from using too much soda. Often, too, fabrics, especially linens, yellow with age if stored too long. The amount of bluing used in any case varies according to the material and weave, the thinner, soft-mesh fabrics, especially lace, absorbing the most color.

Kinds of Blues Used:
- Indigo
- Ultramarine
- Prussian
- Aniline

Indigo, the oldest known blue, comes in powder or lump form. It is obtained through fermentation of the indigo plant. The liquid product thus secured is agitated in order to oxidize it. The blue pigment is the result of this aerating process. Several other treatments are necessary before the crude product is in marketable form.

The process of making indigo blue is tedious, and the quantity obtained per plant is very small. This bluing is therefore expensive. The color is a dull, dark blue, looking almost black when in lumps. Its lack of brightness of color and the cost of manufacturing it have caused this blue to be almost abandoned as a laundry blue.

Ultramarine blue comes in ball or block form, and for chemical testing may be purchased as a powder. The ultramarine of the laundry is not the natural mineral product, *lapis lazuli,* but an artificial by-product obtained from the soda industry. Its composition is very similar to the blue mineral formerly used, having china clay or kaolin as a basis. The ultramarine blue is a double silicate of sodium and aluminum, with sodium sulphide in addition. Different samples of this blue may show slight differences of composition on analysis. It is usually devoid of iron.

The color is a bright blue, known as French blue. This blue is commonly used in the home, but not in commercial laundries. When one considers the large amount of clay material in the blue, and consequently, its small capacity for bluing, it is not difficult to realize that this bluing is not cheap when compared with others. (See analysis of blues, pp. 113-114.)

PRUSSIAN BLUE has copperas and potassium ferrocyanide as a basis. The blue usually appears in liquid form called bottle blue. It is obtainable only occasionally as a powder and then usually from the chemical-supply house.

The color is greenish blue from its iron constituent. This blue is a favorite with many laundresses. If it is used with clothes that have not been carefully rinsed, the alkali of the soap will produce iron oxide, which then deposits as rust spots or streaks on the clothes. When compared with other bluings, this is by no means as cheap a bluing as many consider it.

ANILINE BLUE comes in a powder or crystal form. It is always converted into a liquid state before being used. Like the ultramarine blue, it is an artificial blue, being a by-product from coal-tar.

Aniline gives a great variety of tints, the extremes being a blue blue and a purple blue. This variety of color is valued, for its different tones lend themselves to the launderer's skill in obtaining the desired color for different fabrics. This bluing is sold by the ounce or pound, and may be bought from any laundry-supply house. One ounce makes a gallon of liquid blue.

Aniline blues are of two general types, distinguished by their chemical composition. The one type, the sour anilines, require an acid wash to develop the blue coloring. This blue is used with body clothes, especially collars, cuffs, and shirts. The garments are usually washed with an acid or "sour" wash, which is oxalic acid, acetic acid, or some other acid prepared under a trade name. The purpose of the acid is to neutralize the alkalinity of the soap used in the wash, and to furnish enough acid to bleach the clothes.

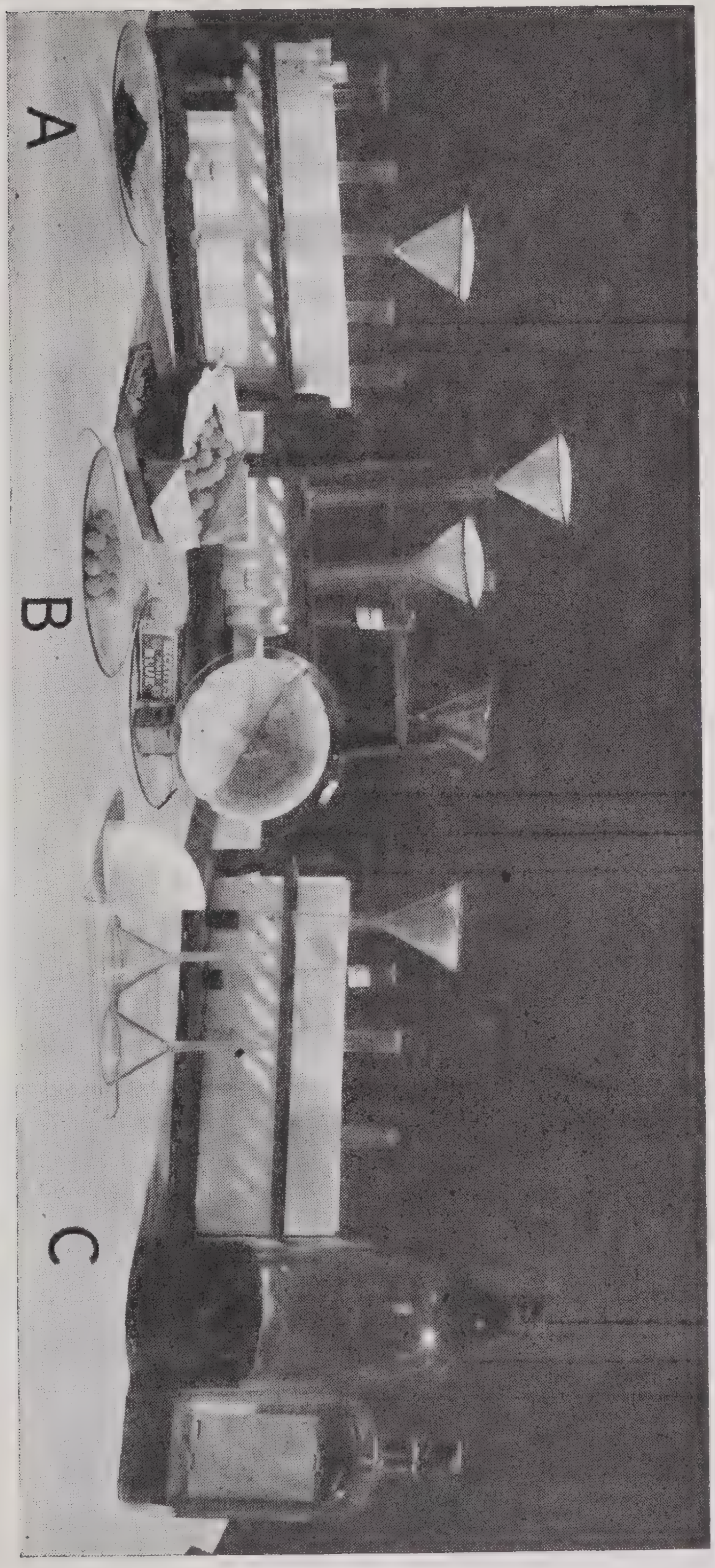


Fig. 41.—Test results for various blues. A, aniline; B, ultramarine; C, Prussian.

The acid removes the yellow discoloration which is formed from the stain of hair, oil of skin, and general soil. This treatment is not so harmful as is imagined, because only three to five ounces of acid are used to about one hundred pounds of clothes. If clothes are to have an oxalic acid wash to act as a bleach, the "sour" blue should be bought and used. A few housewives are attempting to do collars, cuffs, and shirt bosoms, but unless such garments are done, little, if any, of this "sour" aniline blue is needed.

For flat work the aniline used is usually the anti-sour, needing no acids to develop the color. It is the blue most used for regular work, and one that may be recommended to the housewife as economical and safe, producing no iron rust spots and no streaks of bluing on the clothing. Moreover, it has greater bluing power than the insoluble blues. Both types of blue come in varied tints.

Properties.—The blues vary considerably in their solubility and in their reactions to heat and alkali.

SOLUBILITY determines the amount of the blue which is actually used, and therefore the real cost (Fig. 41). A blue entirely soluble in water represents good value, while one that is insoluble or only partly soluble may represent waste or extra work caused by the deposit of streaks or spots. A blue that is soluble enters the fabric, giving a uniform color. An insoluble blue, on the other hand, must be kept in the water by suspension, and blues clothes by the deposit of minute particles on the fabric. The four blues, in the order of their solubility, are:

Indigo—entirely insoluble
Ultramarine—partially insoluble; clay carrier insoluble
Prussian—in commercial form, entirely soluble
Aniline—entirely soluble

REACTIONS TO HEAT AND ALKALI determine the effects upon the fabric and the good or bad appearance of the finished products.

Indigo, besides not having a good color itself and therefore being unable to give a good color to clothes, does not stand heat from the iron.

Ultramarine decomposes in the presence of acids.

Prussian blue disintegrates when it stands a long time in sunlight. Alkali in connection with heat will break it up, giving an iron precipitate. When a garment, which has been carelessly washed and rinsed and blued with a Prussian blue, is ironed, the alkali of the soap combines with the blue and precipitates iron rust on the clothes.

Aniline is but slightly affected by strong alkalies and will stand heat from the iron. It contains no iron, therefore produces no rust spots.

It will be seen from this study of the properties of blues that much more than first cost enters into the choice of a blue. Both solubility and chemical reactions must be taken into consideration. Such a comparative study proves to us that aniline blue is the cheapest and most effective, as it is so soluble, is so strong that only a small quantity of it is required, and gives a clear color to clothes; moreover, being devoid of iron, it produces no rust spots. The only caution that needs to be emphasized in connection with the use of aniline is in its solubility. It is in the nature of a dye, therefore must be used carefully and in very small quantities.

To Make Bluing.—1. FROM LIQUID BLUES.

To the tub of water pour in a small quantity of the liquid blue and stir with the hand to blend. If not the required color, add small quantities at a time, stirring each time. Use about one teaspoonful to a half-tub of water. It is difficult to give a definite amount, as tubs vary in size, and bluing varies much in degree of color. To test the degree of color tone, lower the hand about two inches under the water or put some blue water in a clear glass. It may be tested with a small piece of fabric, but this, too, requires practice. Experience soon teaches the amount to use.

2. FROM SOLID BLUES—ball, block, or lump.

Tie a quantity (three or four lumps will be enough for a family wash) in a flannel, or in three or four thicknesses of cheese cloth. This blue bag is dipped into the tub of water and squeezed, then the water is stirred to blend the blue. Repeat until the desired color is obtained—always less for thin fabrics. The amount of blue for a half-tub of water is about one-third of a ball. Test as under No. 1.

3. FROM POWDERED BLUES.

All powdered blues must be made into liquid form before being used. To prepare aniline blue solution:

1 oz. aniline blue (powder)
1 gal. water (warm)

Stir until dissolved and then filter through filter paper or several thicknesses of fine cheesecloth. For home use store in bottles. A clean, satisfactory way to store bluing in large quantity, as in an institution, is in an earthen-lined water cooler. Any such container must have an unbroken lining, to avoid the risk of rust formation. This cooler also affords an economical, efficient method of using the blue. By using the faucet one can measure the blue directly, without any waste motion resulting from handling of heavy bottles or any loss of blue from accidental spilling. A much smaller quantity of this liquid aniline blue will be needed to make the bluing than of any of the other liquid bluings on the market—about one-half teaspoonful for a half-tub of water. Since it is in the nature of a dye, it must not be used too liberally. Test as under No. 1. For a small washer use the same amount as for a wash tub; for a large washer use one to two liquid ounces (five to ten teaspoonfuls) of the aniline solution in a half-pail of water.

If the clothes are to have a "sour" blue, the process is as follows: Run six inches of water into the machine, add three to five liquid ounces of acetic acid, and run the machine for ten minutes. Add "sour" aniline in a half-pail of water. Run ten minutes. If it is desired to remove iron rust stains at the same time, use four to five liquid ounces of acid, made up of equal parts of oxalic acid solution and fifty per cent acetic acid solution. In this case it will be better to use less water in the machine in order that the acid be strong enough to react on the stains.

To Use Bluing.—Before being used, the bluing water should be stirred each time to blend. In the case of the indigo and ultramarine blues, settling of particles of blue is very noticeable if the bluing water has stood for only a short time. Each article washed should be shaken out before being put into the blue tub. Only a few pieces should be put in at a time. Stirring the blue each time it is used, shaking out each piece, and leaving it in the blue for a few minutes only, will prevent streaking. It is better to dip a garment several times rather than to allow it to stay in the blue tub for a length of time.

To blue in a washing machine is a great saving of time and effort. It can be done easily and with good results in those machines where it is possible to add bluing with the machine in action. The bluing should be prepared in a pail half full of cold water. The clothes are all rinsed and in cold water—enough so the pieces are floating quite freely. Pour in slowly the mixed blue water, which is stronger than it will be when blended with the tub of water. By adding bluing with the machine in action, and in very small quantities at one time, there will be no difficulty with streaks or spots.

To the eight-sheet washer or ten pounds of clothes, use two teaspoonfuls of aniline solution.

To the one hundred-shirt washer or fifty pounds of clothes, use one liquid ounce of aniline solution (about five teaspoonfuls).

The bluing time for the washer is from three to five minutes. Five minutes with dilute blue will produce a prettier tint than three minutes with heavy, dark blue.

The blue color, if the bluing is in the right proportion, will be about taken up by the clothes, allowing little waste of bluing.

Effect of Bluing on Different Weaves.—Materials that are open in weave, as table linen, laces, etc., will take the blue very readily; therefore, bluing for them should be light in tone. For closely woven material, such as sheets, the blue should be considerably deeper.

To Remove Blue.—Clothes that are too blue, as a result of bluing being too deep in color or of accumulation of repeated bluings, should be put into boiling water and allowed to remain for half an hour. When the excess blue will not yield to this treatment, clothes should be boiled. Boil until white. Sometimes to change the water and repeat the boiling process from the cold water stage will give good results.

Tinting.—For very dark blue or black material the bluing should be made very deep in color in order to be of any use to these colors.

Do not use bluing for browns, greens, or pinks, or for any fabric that has a pronounced color of its own, unless it be solid blue.

Experiments for Testing Blues.—Equipment needed for experiments:

Test tube rack
Test tubes—two for each bluing to be tested
Funnels—one for each bluing to be tested
Filter paper—two for each test
Strong alkali—as caustic soda
Dilute hydrochloric acid
Some means of heating test tube
Knife to scrape balls or blocks into powder

CHEMICAL TESTS

Solubility I. 1. Use small quantity of blue—powder enough to cover the point of a pen-knife.
2. Mix well with water, allow time to dissolve, then filter.

3. Note material left on filter paper; this shows insoluble portion; color tone of liquid portion that has passed through filter paper shows soluble portion.

Iron II. 1. Mix small quantity of blue and water in test tube.
2. Add small quantity of alkali—as caustic soda—and heat contents by holding tube in pan of boiling water.
3. Note results: a heavy red precipitate will show presence of iron in insoluble form.

Foreign Materials III. 1. Wash filter papers from II with five per cent. hydrochloric acid.
2. Note results: Aniline blues are not affected. Ultramarine will yield its blue color, giving off distinct odor of hydrogen sulphide; gray clay material will remain on filter paper. Prussian blue will return to its original color and the iron deposit will disappear, having been made soluble by the acid.

Practical Tests for Children

Note: For young children having no knowledge of chemistry, the tests may be shown in a simpler form.

Solubility I. Make bluing from ultramarine blue, and allow it to stand for a little while. Note deposit of blue particles at bottom of tub.

Iron II. Wash a piece of cloth with ordinary yellow laundry soap, which usually contains excess alkali, and rinse sparingly, then use a Prussian blue; then iron. Note results: rust spots will usually appear, or the cloth will have a yellow tint compared with a new piece of the fabric.

III. Treat these rust spots with hydrochloric acid. This makes a good connecting link with the lesson on stain removal.

Questions

1. What are the good and bad points concerning the bluing of clothes?
2. How would it be possible to use an insoluble blue in a washing machine without having it settle and streak the clothes?
3. What experiments could be given a high school class to show the relative values of blues? Such a class would probably know little of chemistry. These tests may be worked out in form similar to the soap tests.
4. To what extent may you expect good results if blue is combined with a soap?
5. Problem: Establish a cost study for blues, showing the weight and cost, and the solubility and cost.

CHAPTER IX

STARCH AND STARCHING

STARCH is of vegetable origin, being found in the seeds, roots, and tubers of vegetables and in the seeds of grains. All starch is in the form of minute granules which are tasteless, odorless, white, and distinguishable from each other only by means of a microscope, which shows each granule to have its characteristic shape and size (Fig. 42). Also all starches have in greater or less degree the power to make a paste when treated with moisture and heat. This power is called viscosity. From the cookery point of view we have many starches, but the laundress chooses only those which meet the requirements of penetrability and pliability. A good starch should give a body to the fabric, so that it will resist moisture, and at the same time give it pliability and a smooth,

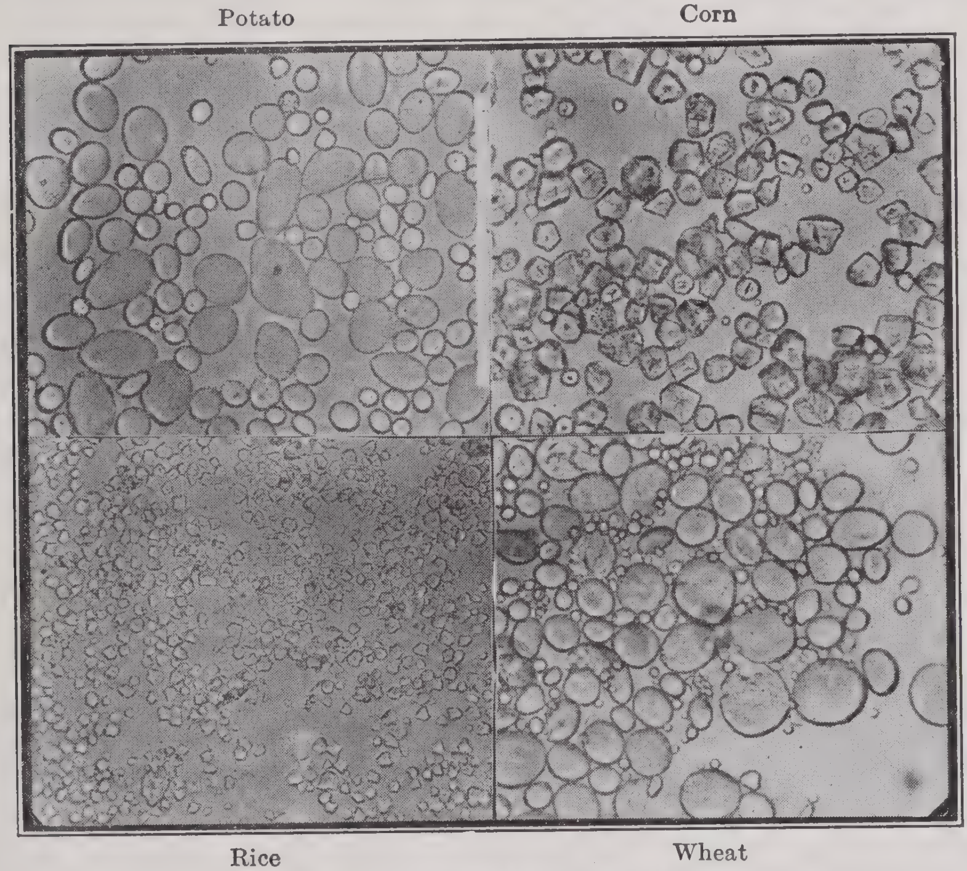


FIG. 42.—Kinds of starch grains.

glossy finish. Laundry starches are rated according to these standards, and a starch which meets them is commercially spoken of as a "thin cooker."

Kinds of Laundry Starches:

Corn
Wheat
Rice
Mixed or "blended"

Corn Starch is the most commonly used because of its cheapness and because of the ease with which it may be obtained. It has been a general commodity, and the housewife, who has had no special interest in laundry problems, has used it as the supply nearest at hand. Corn has the greatest viscosity, hence the greatest power to make a paste. The paste is, however, granular, and if used alone, produces a finished garment that is stiff, rough in texture, and more or less irritating to the skin.

Wheat Starch is more expensive as a laundry starch because the starch granules must be separated from the gluten content which renders wheat suitable for the making of bread dough. When freed from the gluten, wheat starch produces a pliable garment, like new cambric. Its viscosity is less than that of corn, therefore it makes a less stiff paste.

Rice Starch, having the least viscosity, is especially adapted to fine lingerie work, and is being much used for that purpose by experts. It is more expensive than corn or wheat, but it gives to the fabric just the new finish desired—the finish that used to be obtained by the use of dextrine or gum arabic. To economize, one may use the water drained from boiled rice. The amount left from cooking one-half cup of dry rice in two quarts of water may be diluted to one quart with hot water. This quantity will starch several small pieces. Since this starch is so thin, it will not bear further dilution by sprinkling; the garments are not dried, but are rolled and left for ten or fifteen minutes, then ironed.

Blended Starches, produced by mixing starches in varying proportions, are used by professional launderers, who have proved that the results obtained by mixing in special proportions are far superior to those obtained from one "all-round" starch. Where we once had only corn starch, now we find on the grocery shelves also packages of wheat and rice starch; and from the laundry-supply houses it is possible to obtain starch for specific work with standardized proportions. These latter starches are so carefully measured and mixed that in order to secure accurate and uniform results the worker should note the water line in the starch kettle at the beginning and replace any water lost in the process of cooking. (See p. 274.) The starches may be purchased already blended, even to the addition of borax and paraffin, or they may be purchased separately and blended by the worker to suit his own purposes. Corn and wheat are the starches most used for blending. Corn, on account of its viscosity, furnishes the moisture-resisting power, while wheat gives pliability. The rule is about two-thirds corn to one-third wheat for collars, cuffs, and bosoms; for body clothes the ratio is reversed—one-third corn to two-thirds wheat.

Solubility.—Starch granules are insoluble in cold water, and form a milk-white mixture. These grains swell with moisture; when heat is applied, the cellulose covering bursts, and the released starch forms a thick, sticky mass, which is the paste used.

To Make Starch.—Starch paste may be made in two ways, but in both the principle is the same. In either case cold water must be added to the white powder to separate the grains, as they are so fine they mass together when dry, and lump if heat is added before the granules are separated. Heat is applied in one of two ways. The home method of making starch is to add the right amount of boiling water to the cold water and starch. The commercial method, and one good for large quantity work, is to pour into the measured water, which is boiling, the mixture of cold water and starch. The borax, alum, and fat may be added to the cold water mixture. The granules begin to break at 120° F.; all are broken at 212° F. Starch should be boiled gently for about five to ten minutes, until clear, almost transparent, care being taken to prevent burning. It is always wise to use a kettle which is free from rust and scorch stain. Do not let the wooden spoon stand in the starch while it is cooking.

Directions for Use.—Strain the starch before using; this prevents the use of lumpy starch and starch with a skin. Use starch hot. In commercial laundries it is kept hot in steam-heated kettles. This same idea may be used in the home by standing the saucepan in a pan of hot water, or, if the quantity warrants, by using the fireless cooker.

A little bluing is usually added to the starch paste, because the hot starch extracts some bluing from the garments.

The garments should be free from excess moisture, which would dilute the starch and make the degree of stiffness irregular. The starch can be used thinner if the garments are well wrung from the last rinse. Also, if the garment is starched wrong side out, there will be no danger of irregularly made or used starch showing on the right side after the piece is ironed. Work the paste well into the fabric, then wring out all excess starch, and finish by rubbing the remaining starch into the pores of the fabric. Starch which is well cooked and rubbed into the fabric will give little trouble, if the irons are clean and hot. It is a good controlling thought to keep in mind that linen well wrung, with starch thin enough to sink into the fabric, will give better results than can be obtained from the thick, pasty mixture formerly used.

Starching in the Washing Machine.—If the clothes to be starched are in sufficient quantities to warrant using a washer—either domestic or institution—for a "starch load," it is most efficient to set such a load aside, so that it may not only be washed in the machine, but be carried directly through the starching stage. In this way white coats, trousers, aprons, or dresses may be put through all the processes in the washing machine. The clothes are not extracted or wrung out after being blued; instead, the blue water is run off, and the starch paste is poured into the washer directly from the starch cooker. This eliminates one unloading of the clothes and one extraction or wringing before starching.

Practice will soon establish the amount of starch paste to a washer load, and the thickness of the paste will be determined at the same time. As to the amount of starch necessary to saturate the clothes thoroughly in the large power washers, a test may be made by using clear water and finding the number of pails full that will be necessary to show on the inside of the washer. Old models of washers will require more starch paste than will the new, because the distance between the inner and the outer cylinders is greater. Three twelve-quart pails of starch will do about two hundred to two hundred twenty-five aprons. The starch used should be in the proportion of thirteen ounces to one gallon of water. For collars and cuffs the proportion would be fourteen ounces to one gallon of water. Very thin waists and dresses can be placed in nets for washing, and if desired these few pieces may be starched by hand in the wash tub. To starch fine waists in nets is not very satisfactory, because the nets seem to absorb the starch and prevent the thin fabrics from getting their share.

Starching in the machine should involve little or no extra cleaning. The starch paste is diluted by the water remaining in the clothes to such an extent that it will drain out readily. Should any particles of starch adhere to the washer, a quick flooding with hot water will effectively clear it, as well as the drain pipe.

Clear Starching.—For lingerie work and lace curtains, a thin starch is used, one that is only thick enough to produce a new appearance in the fabric. The proportions for this starch are one-half ounce (one tablespoon) of wheat or rice starch to one quart of water. This paste is so thin that it will not permit of further dilution; the clear-starched garment is rolled and allowed to stand for one-half to one hour, then is ironed "out of the starch," *i.e.*, without drying and sprinkling.

Heavy Starching.—For collars, cuffs, and shirt bosoms, or where it is desired to have a heavy garment resist moisture and soil, and not crack easily, it is necessary to use a heavy starch. It is best to use for this work all corn starch, or a corn and wheat mixture in the proportion of two of corn to one of wheat. This starch, on cooling sufficiently to be handled, is like a very soft jelly, but liquid. The collars, cuffs, and bosoms are dried and then starched. The garments are left in the hot starch until it has soaked through them. They are not wrung, but have the starch rubbed in (Fig. 43). The starch is rubbed in until every thickness is wet with starch and each is glued to its neighbor. The dried garment has been forced to take up enough starch to be thoroughly wet. Then stripes of the pattern are straightened, the blisters are worked out, and surplus material, caused by bad making, is pushed to the part where it may be hidden. Finally, with a damp cheesecloth all shining starch on the surface is wiped off. An especially woven cheesecloth, called sponge cloth, may be purchased at the laundry-supply houses for this work.

When the heavy-starched garment has been thoroughly prepared and is ready to be dried, hang it or lay to dry in as near the required shape as space will permit. The starcher who carefully follows this method has really done about three-fourths of the work ordinarily done by the ironer. This whole starching process is quite like that of mounting a photograph, where straightness, smoothness and freedom from blisters are essential.

To sprinkle before ironing, the collars and cuffs are laid in layers in damp cloths with enough pressure to force the moisture through the various thicknesses of the garment. The shirt bosom is put between folds of the sleeves and the body of the shirt, which have been well sprinkled.

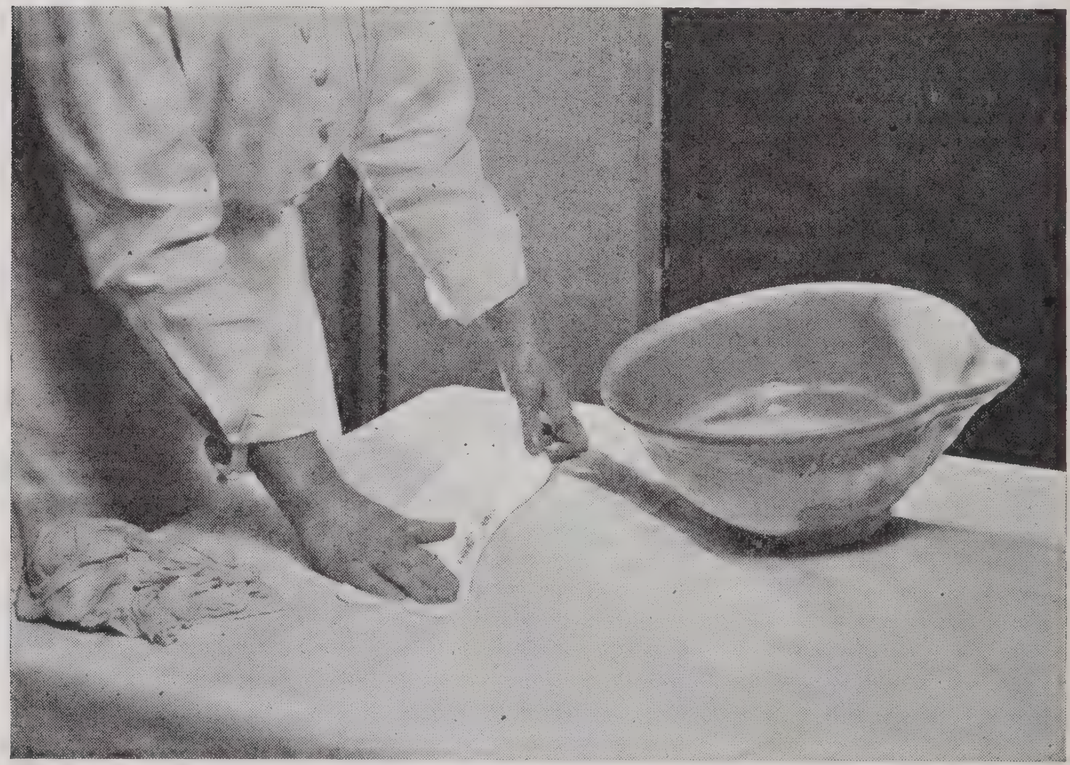


Fig. 43.—Method of rubbing starch into a collar.

Special Collar and Cuff Starching.—A starch especially for collars and cuffs is prepared by a recipe which the commercial laundry man calls the "Cooled Cream Process." The process is a combined use of raw starch and cooked starch. The two mixtures must be thoroughly blended, and to do this the starch kettle for the commercial and institutional laundries is equipped with an electric stirrer or beating paddle. The beating forces the cooked and uncooked mixtures to blend to such an extent as to prevent separating or lumping: Two recipes are given, one for the smaller home work and one for the larger institution work.

For Home Use:

I	II
4 tablespoonfuls wheat starch	2 teaspoonfuls uncooked starch
1 quart water	1 cup cold water
½ teaspoonful borax	
½ teaspoonful paraffin	

Prepare I in the same manner as boiled starch. When it is cooked and ready to use (not too hot), stir in the mixture made from II. Use a wheel egg beater to blend these two mixtures.

For Large Quantity Work:—Commercial Cooled Cream Process.

I	II
6 pounds No. 1 starch	2¾ pounds No. 2 starch
6 gallons cold water	1½ gallons cold water

Moisten No. 1 starch with enough of the cold water in I to make a paste. Add this mixture to three gallons of the cold water in I and boil hard for thirty minutes. Shut off the steam. This part of the recipe should make when cooked five gallons of cooked starch. Add three gallons of cold water; stir while the cold water is being added. Let the whole mixture cool to 130° F. before adding II. The raw starch must not be added to a starch paste hot enough to cook it. Stir No. 2 starch into the one and one-half gallons of cold water, and continue the stirring until the mixture is well blended. Then add this mixture to I, and stir well with an electric beater for ten minutes. This recipe makes ten gallons of starch. *(Courtesy of Kohnstamm & Co.)*

It is possible to make this starch in a washing machine that is well equipped with steam, is non-leaking, and has good valves. The same method would be followed as is used when starch is made in the starch cooker. A one hundred-shirt washer would require about twenty gallons of finished starch, or twice the above recipe.

Uncooked Starch.—The use of raw starch requires much greater skill on the part of the ironer, for in this method the iron really makes the paste by cooking the starch while passing over the collar or cuff. It will be found that the fiber absorbs this starch readily because it is so penetrating (see p. 117), with the result that a very stiff garment is produced. Because of the difficult ironing involved in this method, we find most experts making the heavy starch described above.

Starch Accessories.—Borax, alum, paraffin, wax, and lard may be called starch accessories.

Borax and alum increase the clearness of color, pliability, and gloss of the starch. Alum thins the starch without affecting the strength of the mixture.

The waxes and fats, which should be white, are used to make a smoother starch, one that will adhere to the iron less easily. The left-over ends of white candles may be used for this purpose. Butter is not suitable on account of its color.

Starch Substitutes.—Borax, dextrin, gum arabic, and glue may be used with the starch, but are most often used as substitutes instead of starch. They are especially good for delicate fabrics and colors, on which the whiteness of starch may be noticeable.

Borax and dextrin were formerly used for thin cotton or linen fabrics, usually in the place of starch; but with the great advancement in modern starch manufacture they are less necessary for special work. Glue may be used for dark-colored fabrics, but has now been superseded by a "mourning starch," which is so darkened in manufacture that it does not show white on blues, browns, or blacks. Darkening the ordinary starch mixture with a clear solution of black tea will make a satisfactory starch for brown and black fabrics. Gum arabic is little used in the home because it requires special handling, and may become sticky in a moist climate. It is, however, a good substitute for starch or glue in the finishing of silks which require a slight stiffening. Use one tablespoon of gum arabic to one quart of water. Strain through a cloth to be sure that no lumps of gum remain. As different fabrics take up this stiffening in different amounts, the worker must expect to experiment before planning to finish quickly. The amount of stiffening will never be determined until the fabric is ironed, therefore test by ironing a small portion. If the garment is too stiff, rinse it in warm water, and, after rolling, iron again. This rinsing often leaves just enough stiffening to give a satisfactory finish.

Tinting Starches.—The use of tea liquor, bluing, or colorings makes it possible to starch any color without having it show, and also makes it possible to replace some color that may have faded in washing.

Tea makes good ivory, old lace, and ecru colors. It is better than coffee, as the liquor is more likely to be clear and to have less odor. Cook a cheap black tea (about one tablespoon to a pint of water) until a strong colored liquor is made. Use enough of this to get the tint desired. This tea water must take the place of some of the clear water allowed in the starch recipe or the starch will be too thin.

Tinted starches should be tested first on a small piece to see if the color is good. Remember that it will be lighter when dry. Various dyes can be added to the starch mixture. See Chapters XIII, XVIII.

Recipes for Starch:

	Water	Borax	Wax or Fat	Starch		
				Corn	Wheat	Rice
Heavy starch	1 qt.	½ tsp.	½ tsp.	3 tb.	5 tb.	5 tb.
Thin starch	1 qt.	½ tsp.	½ tsp.	1½ tb.	2½ tb.	2½ tb.
Clear starch	1 qt.	½ tsp.	½ tsp.	½ tb.	1 tb.	1 tb.
Raw starch	1 qt.	½ tsp.	½ tsp.	1 tb.	1½ tb.	1½ tb.
Gum arabic, 1 tb. . .	1 qt.	. . . . .	. . . . .	. . . . .	. . . . .	. . . . .

tb.—tablespoon tsp.—teaspoon pt.—pint qt.—quart

Questions

1. Make a cost study of package and loose (pound) starch. Weigh contents with and without container.
2. To what extent does the starching of one week hold over to the next? How does this influence the soil of clothing?
3. To what degree does starch reduce color in colored clothes?
4. Prove the value of starch substitutes by a "starching" of fabrics, using no starch.
5. Problem: Make a study of starch solvents, or digesters, that might be used for the removal of dressings from new fabrics and of old starch from soiled garments, such as collars.

CHAPTER X

OTHER CLEANSING AGENTS

In this chapter there is no thought of providing a text on chemical analysis, but only some brief explanations of the chemical nature and properties of the everyday laundry cleansing agents. The classification has been made by grouping these agents as solvents, bleaches, and absorbents.

Water.—In its chemically pure state water is composed only of hydrogen and oxygen, but as found in nature is an exceedingly variable compound, for it is one of the best solvents known. It varies from rain water, free from most impurities, to ground and surface waters, containing a wide variety of suspended and dissolved impurities. These include suspended organic and inorganic matter, and dissolved gases, organic compounds, and minerals such as salts of calcium (lime), magnesium, iron, and manganese.

For laundry purposes, as someone has aptly said, the nearer the rain barrel we can get the better it will be. Water for washing should be clear, free from color and odor, and as soft as possible. Turbid water is, of course, not as clean as it should be, and will introduce into the washtub foreign substances that add to the work of rinsing. These substances may be removed by filtration. Color and odor in water also indicate the presence of impurities that will at least produce poor color in the clothes, and may be actually deleterious. Soft water is most desirable for washing purposes, since it contains little or no chemical material which will interfere with the cleansing process. Hard water may be either temporarily or permanently hard. Temporarily hard water can be easily changed, as the salts which are in solution will precipitate at boiling temperature. Permanently hard water, however, carries in solution certain salts, usually of lime and magnesium, which are not removed by boiling. These salts combine with the soap used in washing, forming an insoluble lime soap which is deposited on the fabrics as a gray film and as soap specks, and which is very difficult to remove. They are wasteful of supplies, also, for enough soap or soda must be used to overcome this tendency of the lime scum to settle on the clothes, or, in other words, to overcome the hardness of the water. Therefore, it is essential to good, economical laundry work to remove these salts by some means which will precipitate them. Soda can be used to soften the water, but an excessive amount, such as would be needed for certain localities, is harmful to the clothes. It is better to use a softening agent that prepares the water before it is used in the laundry. (See page 296.)

Washing Soda or Sal Soda.—Sodium carbonate is a clear, glassy, crystalline salt, soluble in water. It effloresces in dry air by loss of its water content, assuming a powdery appearance. This efflorescence does not affect its solubility, but is a disadvantage, because it makes useless the recipes given for soda of a standard water content. On account of this fact, it is wise to keep soda well covered and preferably in crockery. Anhydrous sodium carbonate, also called soda ash, is the salt from which caustic soda is prepared. It differs from sal soda only in the amount of water of crystallization which it contains.

Soda is extremely important in the laundry, because it has the power of softening water, as well as good detergent qualities. It emulsifies grease, thereby releasing the dirt, so that both grease and dirt may be removed by the wash water. It thus becomes an economy, as it saves soap, a more expensive product than soda. However, it is most important that soda be used in a mild carbonate form, as the stronger caustic soda is much too destructive to be used on clothes.

CAUSTIC SODA.—This is never used as such in the cleaning process, but as the alkaline base for soaps. It comes in stick or flake form, and must be handled with iron forceps or bone spoon, as it has a destructive effect on the skin due to its violent affinity for water. (See also p. 96.)

MODIFIED OR NEUTRAL SODA.—Since none of the above sodium compounds, with the exception of sal-soda, are used directly in the washing process, it has been necessary to manufacture so-called modified or neutral soda. The usual combination is approximately equal parts of sodium carbonate and sodium bicarbonate, plus water of crystallization. The resultant compound is called neutral. This compound is safe to use in the laundry, provided that it is not used in excess, being especially good for the soaking of coarse, dirty clothes. Grease stains on table linen may be saponified by adding soda to the water in which the linen soaks. Dissolve one cup of soda in one-half tub of water, then add the table linen. It is not ordinarily obtainable at the grocery stores, but as soon as the housewife realizes its value, she will create a demand for it in five- or ten-pound packages. Laundry-supply houses will send it by parcel post if ordered in reasonable quantity. It will be found much more economical as well as more satisfactory to purchase the soda as such, rather than under trade names which do not indicate the strength or quality of the soda.

The tests of a good modified soda are its solubility, its free running quality—such that it can be poured from its container, and does not lump—and its fineness. The standard test in commercial laundries, as given by the Laundry Board of Trade, is that the bulk of it should pass through a wire sieve of 80 to 200 mesh to the square inch.

Caustic Potash.—This is a brittle, white, deliquescent substance, very soluble in water, with alkaline reaction. It is very strong in its reaction, and must not be touched with the hands, as it has a caustic action. Its chief use is in the making of soft soap, though on account of its expensiveness, it is less used than caustic soda. (See also Chapter VII, p. 96.)

Benzine and Gasoline.—Hydrocarbons of this type are obtained in the distillation of crude petroleum. The products of this distillation are naphthas—including benzine and kerosene—vaseline, paraffin, lubricating oils, etc. Crude petroleum yields gasoline of all gravities. The lowest gravity is too highly volatile to be practicable for use, so it is not put out commercially in this form. The lowest gravity used in cleaning is in the form of benzine, the next higher form being that usually spoken of as gasoline.

These agents are valuable as grease solvents and as cleaners of metal work on machinery. Both are volatile, but they have a disagreeable odor which clings to clothes, and which is satisfactorily dissipated only by hanging the garments in the open air. Both reagents are highly inflammable; therefore, if used at all, they must be kept away from heat of any kind, and must not be subjected to too much friction, as this may cause a spark. Do not clean gloves on the hand. **The safest plan is to use either reagent out of doors.** (See also Chapter XVIII, p. 191.)

Benzine, if not free from water, will form damp spots on the garment, which attract to themselves more dirt, thus defeating the purpose of the "spotting." Pure benzine leaves no residue on evaporating. Benzine, after being used, can be purified by filtration through sand and sawdust, all gritty material being mechanically removed by this process. Benzine is sometimes incorporated in soaps, to give an added detergent quality.

GASOLINE should be colorless and mobile, and leave no residue after evaporation. Pure gasoline gives a violet color with potassium iodide. As its great danger is its inflammability, dry cleaners mix it with carbon tetrachloride; the resultant compound leaves no ring. Gasoline, besides being very expensive, has an added disadvantage in that it has an anæsthetic effect on the worker.

Benzol.—This is a hydrocarbon containing from fifty per cent. to seventy per cent. of benzine. It resembles benzine in that it is a grease solvent. It is inflammable, so must be used with the same precautions as benzine. In cleaning it leaves less of a ring than gasoline. Its special value in stain work is that it is an excellent solvent for dried paint stains.

Kerosene.—Kerosene is a colorless hydrocarbon liquid of higher gravity than gasoline, but of variable composition. It is less volatile than gasoline. However, it is inflammable, so must be handled with care, and kept away from contact with an open fire.

Its special value in laundering is due to its quality as a solvent of greasy matter. Its uses are varied: it is a fuel; a solvent for rust on iron, lampblack, stains on wringer rolls, spots on porcelain; an aid for removing stains on clothing; a cleanser of washing machines; an ingredient of soaps; an aid in heightening the gloss of starch. It is sometimes used—in the proportion of two tablespoons to a boiler of water—in the boiling of clothes to save rubbing, but its use necessitates an extra care for thorough rinsing to remove odor.

Paraffin.—This wax is a solid belonging to the hydrocarbon group. Its special use in the laundry is to give smoothness and gloss to the starch; it may also be used in the place of beeswax for smoothing and cleaning irons.

Carbon Tetrachloride.—This compound is a colorless liquid which dissolves fats, tar, and many other organic compounds. It is used for removing grease from fabrics, and is the foundation of many patented grease removers. Its advantage over gasoline is that while it is equally efficient for removing grease, it is in addition noninflammable. In fact, it will smother fire, and is used in fire extinguishers. It has less effect upon the worker than chloroform and ether, with their great anæsthetic power. Carbon tetrachloride may be stored in an ordinary glass bottle, as it is not affected by light.

Ether and Chloroform.—*Ether* is obtained from the action of strong sulphuric acid on alcohol. It is very volatile, boils at 35° C., and is somewhat soluble in water. *Chloroform* is a heavy, clear, colorless liquid, with a sweet, burning taste; it boils at 61° C. It should be kept well covered and in a dark place, because when exposed to the light it changes its composition to such an extent as to lose its cleansing qualities.

Both ether and chloroform have their principal use as anæsthetics, but are also of importance in cleaning on account of their solvent powers. Chloroform is a solvent for fats, resins, and gums. It is non-inflammable, so is safer to use than ether, which is both inflammable and explosive. Both are used by dry cleaners as spotting agents, but must be chemically pure or they themselves will produce stains. Both reagents may extract color. A mixture of equal parts of ether and chloroform is especially good for grease.

Ether is used in combination with other ingredients to make cleaning fluids. One cleaner for leather tissues is made of one part ether to four parts turpentine. Another, called *ether magnesia,* is made by mixing magnesia—talc may be substituted—with enough ether to make a paste. Spread paste over spot. After the ether has evaporated, brush the magnesia from the garment and rub fabric with a piece of soft white bread (See also *Magnesia*).

Alcohol.—The form of alcohol known as wood spirit or wood alcohol is obtained from the destructive distillation of wood. It is used to dissolve resins and in making anilines. It should be handled with care as it is a poison.

Commercial alcohol or grain alcohol is obtained from the fermentation of glucose and the distillation of its products. It is a colorless, mobile liquid, which burns readily with a blue flame, producing great heat and liberating carbon dioxide and water.

Denatured alcohol is a mixture of wood alcohol and grain alcohol, with a hydrocarbon added to prevent its use as a beverage. Both wood and denatured alcohol are poisonous.

In the cleaning process alcohol in any of the three forms may be used. Its special use is as a solvent for medicine and varnish stains. It is less likely to extract color than either chloroform or ether.

Turpentine.—This resinous substance is obtained by distillation from the gum of the southern pine. It is a solvent, having special power on varnish, fresh paint, and vaseline. It is, therefore, a valuable agent in the removal of stains. It is also sometimes used in the place of paraffin in making starch.

Ammonia.—In its natural form ammonia is a colorless, transparent gas, with a penetrating odor. It is used in the laundry in liquid form. Its chief uses are as a softener of water, as a mild bleach for woolens or silks, and as a solvent for grease. It will affect color.

Borax.—This salt is colorless and well crystallized, having a mild alkaline reaction. It is effective as a cleaner and a bleach, though its action is milder than that of washing soda. It can be used with delicate fabrics, which might be harmed by washing soda. It is an effective alkaline cleanser for woolens, as it is too mild to harm the fiber. Borax may be used to give a slight stiffness—really a new appearance—to such fabrics as organdie, lawn, or swiss. It is added to the final rinse water, and the garments are ironed without being previously dried.

Boracic Acid (or boric acid), is a disinfectant, which is used little in the laundry.

Potassium Permanganate.—Potassium permanganate is a bronze crystalline substance, readily soluble in water. The solution is purple or reddish-purple, according to its concentration.

Its value in cleaning is that it is a strong oxidizing agent, particularly in the presence of an acid, though active also under neutral or alkaline conditions. It bleaches by freeing oxygen. In stain removal it is usually followed by oxalic acid after the permanganate has oxidized the stain (see p. 24). It will remove stubborn or unknown stains of almost any source, but, of course, like any other bleach, it will remove color. The proportion used is three grams in one liter of water—a scant teaspoonful to a quart of water. Filter and keep ready for use.

Sulphur.—Sulphur is a yellow, brittle substance. When burned in the presence of oxygen, it gives off a gas, SO_2, which has good bleaching qualities, effective only in the presence of water. This method of bleaching is used for woolens. Be careful of fire in doing any sulphur bleaching (See p. 23).

Hydrochloric Acid.—In its pure state the acid is a colorless gas, having a pungent odor and taste. It has a strong affinity for water, as shown by the fact that it fumes strongly when exposed to the air. It is non-combustible. The fumes from the concentrated solution are very irritating to the mucous membrane, producing a "cold." In excess doses these fumes are poisonous. Care must be used in diluting this acid, as well as sulphuric acid, because the union of concentrated acid and water causes a sudden generation of heat and a boiling action. This may spatter the worker with acid, which will cause burns, or may make holes in the clothes.

Commercial hydrochloric acid is a liquid obtained as a by-product of the manufacture of sodium carbonate, or washing soda. It is yellowish in color, this being due to impurities such as arsenic, sulphuric acid, chlorine, ferric chloride, and sulphurous acid. This form of the acid is never used by launderers for stain removal, but the pure hydrochloric acid is valuable in removing rust stains. The "crude" hydrochloric acid can be used, however, for cleansing metal cylinders of washing machines, since it has little action on the metal, and at the same time is the most thorough solvent of the lime soap coating (see p. 82). Even on aluminum or zinc cylinders its rapid use is possible because the lime coating acts as buffer between it and the metal.

Hypochlorous acid is much used for bleaching purposes, either in liquid form or as an ingredient of bleaching powders. It decomposes readily, therefore is a good oxidizing agent.

Oxalic Acid.—Oxalic is the oldest known organic acid, and is found in plants of the oxalis family, including sorrel, rhubarb, etc. In its natural state it is an excellent metal cleanser. As it is poisonous, it should be plainly labeled as such. It is sold as a white crystalline substance, which must be dissolved in water, the full strength requiring one ounce of crystals to three-fourths cup of water. This solution should be diluted for use by an equal quantity of water.

It is used in the laundry to extract iron rust from linen, and as a bleach, either alone or with potassium permanganate. A mixture of equal parts of oxalic and hydrochloric acids is a good bleach, but it must be thoroughly neutralized to prevent destruction of the fiber. It must be prepared each time it is used, as it does not keep. Oxalic is a good bleach for straw hats, but it should be thoroughly rinsed out, or neutralized with ammonia or borax water.

Oxalic is very satisfactory in cleansing metal washing machines, probably ranking next to hydrochloric acid for this purpose. The proportion is four to six ounces of the crystals to a hundred-shirt washer. Dissolve the crystals in a pail of water before adding to the machine (See p. 82). There is on the market a so-called Commercial Oxalic, sold under various trade names, which is much used by laundry men for cleansing machines. Oxalic, acetic, and citric acids are used for this purpose, but of the three oxalic is the most efficient for this as well as for many other purposes in the laundry.

Oxalic acid is called "sour" in the commercial laundry. It is used in the rinse, especially for collars and cuffs, because it acts as a bleach for the yellow stain which so easily comes from the use of too much soda or from the oil and perspiration to which collars are subjected. The acid neutralizes any alkalinity remaining from the soda or bleach. If clothes are "soured" during the process of washing, the "sour" blue should be used in the final rinse or blue water. "Sour" blue must not be used unless the clothes have been rinsed in an acid rinse following the hot rinse after bleaching (See pp. 108, 112).

Citric Acid.—This is a colorless, crystalline substance, insoluble in ether. It was first obtained from lemon juice; it is also found in many other fruits and in some bulbs and tubers.

Its uses in the laundry are similar to those of oxalic, though it is not as strong a reagent as is oxalic.

Acetic Acid.—This is a clear, colorless liquid, with a penetrating odor and sharp taste. It is found in vinegar, but is also obtained from the distillation of wood.

The commercial fifty per cent. solution is an excellent solvent for many medicine stains, and is used in the manufacture of dyes. It is useful in the laundry also to set colors, to remove glue stains, and to develop some aniline blues.

Potassium Binoxalate.—Salts of lemon is a white powder resembling cream of tartar. A mixture of salt and lemon juice is the housewife's substitute. This chemical is not guaranteed against making holes unless the garment is well rinsed or washed in soap and water to remove all traces of the reagent. Because salts of lemon seem very harmless, the worker often carelessly applies the dry chemical to the moistened stain without first preparing the proper solution. A dry chemical of an acid or alkaline nature should never be applied directly to any fabric. The salts of lemon should be dissolved in water in the proportion of four teaspoonfuls of chemical to one cup of water. Before using it for stain work, dilute it further with an equal quantity of water.

Chloride of Lime.—The natural form is a white powder, having the odor of hypochlorous acid. It is useful as a disinfectant and as a bleach. It is not used in the laundry in its original form, but is combined with washing soda to make Javelle water, a chlorine bleach. (Recipe, p. 29.)

Hydrogen Peroxide.—This is a clear liquid, noted for its instability; it will slowly decompose if allowed to stand exposed to light or air. It is manufactured largely for medicinal purposes, but is a good bleach, as it readily gives up oxygen.

In the laundry it is used as a bleaching agent for white silks and wools, in the proportion of one part peroxide to fifteen parts water. The peroxide manufactured for medicinal purposes is slightly acid. This acidity should be neutralized with ammonia or borax before the reagent is used as a bleach. Use one drop of ammonia to about three teaspoonfuls of the peroxide.

Magnesia.—It is a white powder, practically insoluble in water, with a neutral reaction.

Since it is an absorbent, its only valuable use in the laundry is in removing grease spots, particularly on such garments as cannot be washed. Lace may be kept in good condition if, each time it is taken off, it is laid away in folds of tissue paper and sprinkled generously with magnesia. Do not use magnesia except for grease spots, and preferably on light colored fabrics. It is apt to leave a white mark on dark colored fabrics, so for these carbon tetrachloride is a better reagent.

BENZINIZED MAGNESIA, used for grease spots on silk, is made by mixing the magnesia with just enough pure benzine to make a moist, crumbly mass. Spread the mixture over the spot, rubbing it thoroughly with the finger tips. When the benzine has evaporated, brush off all particles of the magnesia.

ETHERIZED MAGNESIA, made in the same way, has been mentioned above (See *Ether*).

Fuller's Earth.—This absorbent or chalk, cornmeal, dry laundry starch, may be substituted for magnesia as absorbents.

Alum.—Alum is a crystalline substance, readily soluble in water, with acid reaction.

It has three principal uses in the laundry: It is used in the dyeing process, as a mordant; on account of its ability to clear turbid liquids, it can be used to clear dirty water; used alone or with borax in starch, it improves the color, increases the penetrability and pliability of the starch, and thins the starch mixture. Alum, in the final rinse for lace curtains and babies' clothes, causes the fabrics to be less inflammable.

Waxes.—Of varying composition, the waxes are allied to the fats, but are distinguished from them by the absence of glycerin. They are of vegetable origin—the wax tree, bayberries—and animal origin—bees.

BEESWAX is the wax most commonly used in the laundry. It is a solid, fatty substance secreted by bees in constructing their hives, and is composed of three chemical principles—myricin, cerotic acid, and melissic acid. It is sometimes bleached in the sun, but may be bought either white or yellow. The white wax is purchased to use in making starch in the place of lard or tallow, to render the paste smooth and glossy. Its particular laundry use is for cleaning irons and for coating them to prevent rust when they are packed for storage.

Questions

1. In a certain locality every drop of water is made by melting ice. What ways can you suggest for saving it and still having clean clothes?
2. How can soap be used with gasoline in dry cleaning?
3. What economic value has kerosene in the laundry department?
4. Problem: Make a comparative study of the different bleaches used in stain removal—their cost, their efficacy, and their effect on fabrics.

CHAPTER XI

TABLE LINEN AND BED LINEN

TABLE LINEN

Stains.—Chocolate; fruit; grease; cream, oil, gravy; iron rust; meat juice, gravy, soup; old stains, boiled in; tea and coffee; vegetable.

To remove, see Chapter III.

General Methods.—Review Chapter V for methods of washing all white clothes.

Soaking.—Soak table linen one-half hour in lukewarm or cold water without soap. Do not use hot water, as it will set some stains. The way table linen is put to soak does much to reduce the washing time and the chance of setting stains. Any known grease stain can be put to soak in cold water with soap applied directly, but if there is any doubt as to the composition of the stain, use only cold water. For washing machine work, the table linen is easily cleansed of all grease stains by adding one-half cup of modified soda, which has been previously entirely dissolved in hot water, to the tub of water in which the clothes are soaking. Run the machine five to ten minutes, when all the grease stains will be saponified.

Washing.—In the hand-washing process table linen does not need much rubbing, because it is rarely very soiled; also, the looseness of the fabric makes it easily cleaned if the stains have been removed; it should be washed on both sides with care not to omit sections. The clothes-wringer should be loosened for all table linen, as the material is soft and creases easily.

Boiling Rinsing Bluing	See pp. 57-61.

For table linen, the blue water should not be as deep in color as for other fabrics, because of the softness of the material.

Table linen is not starched, except perhaps to make poor linen look like a better quality. Very thin linen and rough cotton will look better if rinsed with a thin cooked starch water before drying. In the case of the cotton fabric it acts as a glaze imitating linen, and does not stiffen unless too much is used.

Hanging.—All table linen should be well stretched and hung very straight. It is found better to hang a third or a half of the tablecloth or napkin over the line, as pinning from the corners and edges causes tearing. Good hanging does much to hasten the ironing, provided the linen is folded when it is taken from the line, and not just dropped or crushed into a basket.

Sprinkling.—Table linen may be taken from the line when half dry. The even dampness secured by this method especially facilitates good ironing. Dried table linen should be thoroughly and evenly sprinkled. In either case fold even, roll tight, and wrap in a heavy cloth, or roll several cloths together. Lay napkins in piles for sprinkling, and roll in bundles or else in the tablecloths. A heavy hot iron on such damp linen will develop a gloss, and the pattern will shine prettily if ironed until dry.

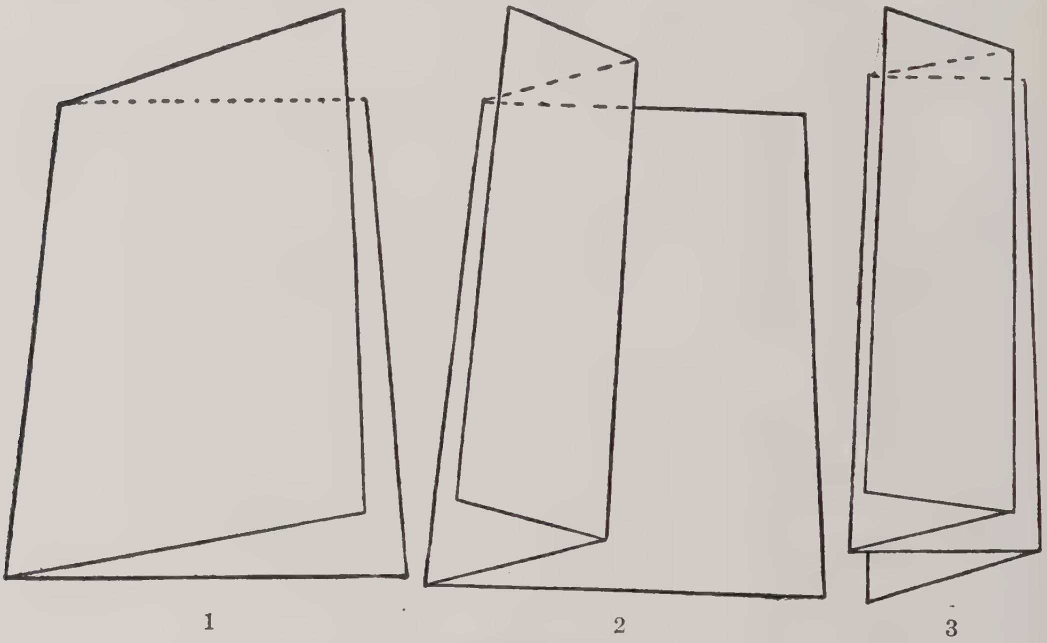
Ironing.—Use heavy irons and iron dry. All linen should be ironed partly dry on the wrong side, and then finished on the right side. Embroidery should be ironed on the wrong side, on an embroidery pad, or folded clean soft cloth. Fringe should be brushed with a strong whisk broom, then trimmed with scissors, to cut away all fray and to give an even edge. Combing is not good for fringe, as it tears the threads.

Fold table linen with either three or four lengthwise folds—if in four folds, place selvages together. See chart, Fig. 44, I and II. Fold all edges very even, except when folding the lengthwise folds in half. Here the upper half should be drawn back about one-fourth inch; otherwise, in making the last fold, the middle part will be pushed out about that distance, making the edges uneven. The placing of a monogram or initial naturally controls the folding, even beyond the so-called accepted rules. This applies equally to table linen, sheets, and handkerchiefs.

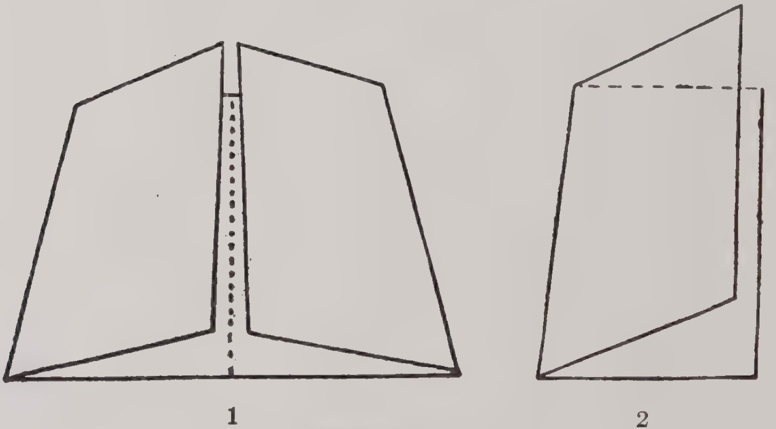
Round tablecloths are folded in half lengthwise, and in half crosswise, but beyond these folds no creases should be ironed. The accepted fold for round cloths is from the center out, pie fashion, but even this may be given up because the linen drawer is not long enough. Should any cross folds have to be made, insert a heavy roll of paper to prevent the creases from forming.

Tray cloths should be folded in three folds, if it is necessary to fold them. It is better to lay them flat, or to roll them about a paper roll. Special rolls may be made of pretty cretonnes for all such linen.

Embroidered Centerpieces.—These should be washed with special care, if colored embroidery silk is used; otherwise with white goods. White embroidery is always good style, and certainly much less care in the laundry. The ironing often gives the most trouble; no matter what the shape of the centerpiece, iron in straight lines, straight with the fiber of the goods, being sure to iron dry each portion before beginning a new one. Centerpieces with little or no embroidery, but with wide lace borders, like Cluny centerpieces, should have the linen center stretched taut and held in shape with pins placed close together. Having pinned the center, stretch



Fold No. I.



Fold No. II.

Fig. 44.—Diagram showing two special methods of folding table linen.

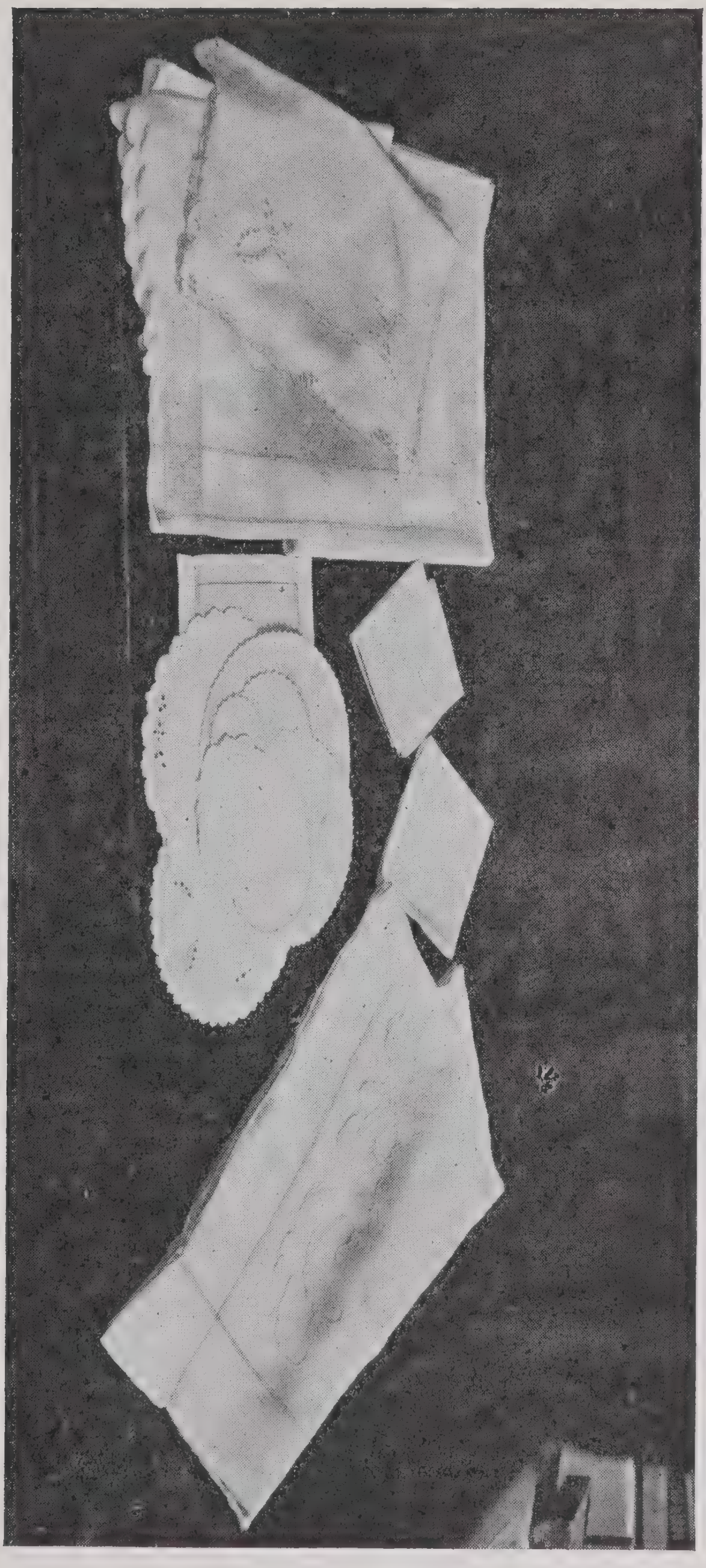


Fig. 45.—Hand ironed table linen.

the lace border into shape, and pin it carefully. Let the whole remain this way until perfectly dry, then no ironing will be necessary, except perhaps if one wishes to have the linen glazed. If the linen is to be glazed, be sure to iron around, not over, the embroidery, as the iron will flatten and glaze it. For pinning, see Chapter XVI, Fig. 60.

Machine Ironing of Table Linen.—The linen should be quite damp and fed into the machine from the hem side, right side down. Doing this allows the linen to be held taut and straight. As far as possible, do not feed double, because it makes a strain on the fold of the cloth, and necessitates feeding it through the ironer twice. The ironer does excellent work, but its pressure is great, and pressure with friction cannot help but produce some wear (See Chapter XXII, p. 282).

To make machine ironing as fine as hand work, the table linen must be put through twice, the first time with right side down, the second time with wrong side down. In this way the cloth has two ironings, which give the same smooth finish as when ironed by hand.

Centerpieces and doilies ironed on the machine should be ironed on both sides, and the second time the circle may be made quite round if it is turned half round before being fed into the ironer. If one did not do this, the centerpiece would be oblong rather than round. For heavy embroidery, it is well to feed in a towel or soft cloth at the same time, as this gives a cushion for the heavy embroidery to sink into. This is, of course, on the same principle as using an embroidery pad for ironing. Any linen with fringe is better done by hand.

BED LINEN

Stains.—Blood, ink, iron rust, medicine, vaseline (See Chapter III).

Soaking.—Soak half an hour with soap in lukewarm water, after any special stains have been removed.

Washing.—In the hand-washing process bed linen should be washed on both sides, with care to wash regularly from one side to the other. Pillow cases should be turned wrong side out in the washing, and then left in that condition until folded for sprinkling. In washing bed linen the hems require special care. They should be well soaped and rubbed. Pillow slips require the most care, as they have greater chance to be stained from the oil from the hair. Pillows discolor for the same reason.

Boiling
Rinsing } See pp. 57-61.
Bluing

Hanging.—Sheets may be hung in the same way as tablecloths. Pillow cases are hung by the seam opposite the hem. If opened to the wind, they are liable to be torn, as there is no opening opposite; the wind fills the cases, forcing and tearing them from the line.

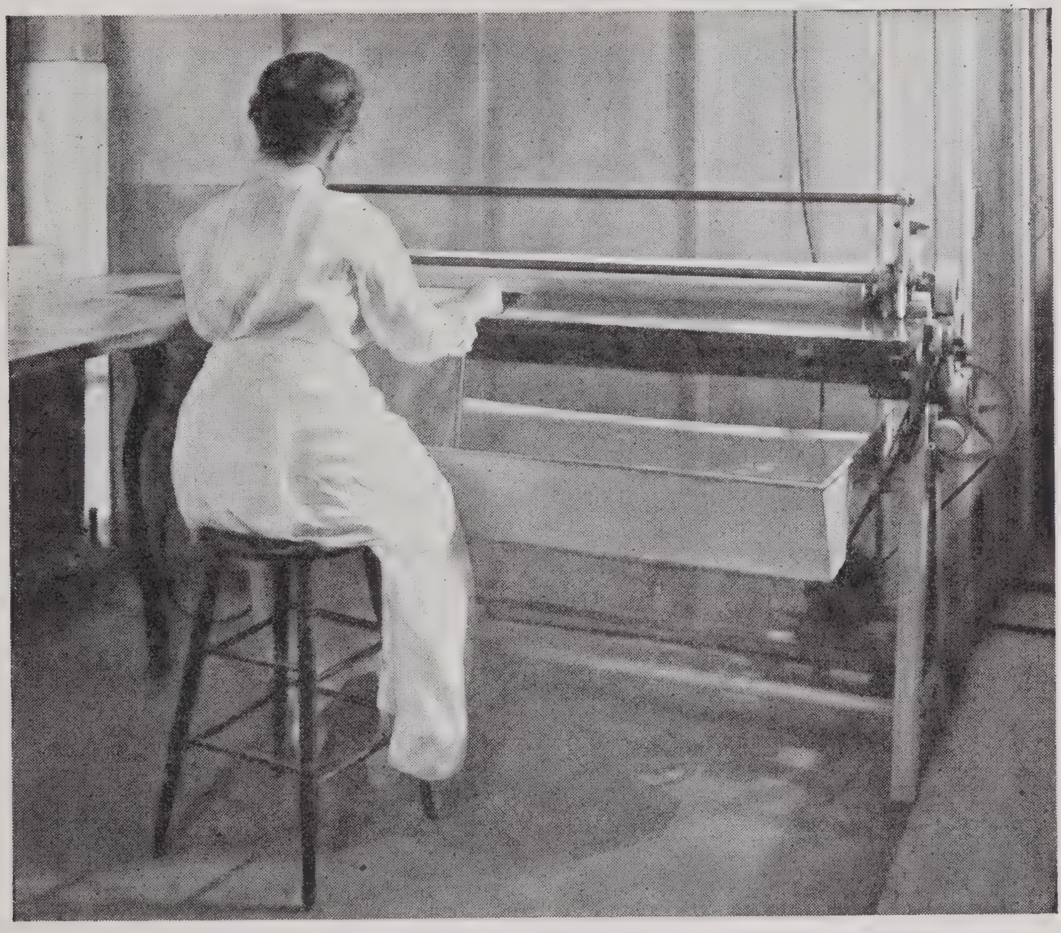


FIG. 46. Machine ironing in the home.

Sprinkling and Folding.—In sprinkling, give special attention to hems, not sprinkling the middle of sheets so heavily. Sheets are usually folded in fourths lengthwise, having selvages together, and then in fourths crosswise, although some prefer to fold the hems together. Pillow cases are turned right side out.

Ironing.—Care should be exercised in ironing hems. The sheets may be folded with the ordinary fold, or may be folded the same as tablecloths. (See chart under Table Linen, Fig. 44.) Pillow cases should be ironed very smooth, and if there is embroidery on them, it should be ironed first, and on the wrong side. Always iron the case itself by beginning in the corner where the side and end seams meet; iron from the side seam across the case. The cases should be folded in thirds—that is, with only two creases—and the middle third fold is folded out unless the mark requires a different finish. The marking of linen determines the method of folding, in that it is customary to fold the mark out.

Machine Ironing of Bed Linen (Fig. 46).—Sheets should be fed in single thickness if possible, with the hems inserted first. Always iron by placing the sheet right side down. If sheets must be folded to make narrow enough to go through a small ironer, fold them lengthwise, right side out. A folded sheet must be put through the ironer twice at least. This shows that too small an ironer is poor economy. (See Chapter XXII, p. 282.)

Pillow slips are fed into the machine seam end first. When they have gone through the ironer once, they may be shaken or snapped; this will open the slip without creasing it, and then it is ready to be turned unironed side down and fed through a second time.

Questions

1. Given a tablecloth containing stains of olive oil, cranberry jelly, roast chicken gravy, and strawberry ice cream, with dark shadows of stains from last week's poor work—how would you proceed to make the cloth like new?
2. Make a time study of ironing round and square doilies of the same linen area.
3. From a laundry point of view, which is the greater economy—a doily service for two meals and a cloth for one meal, or a tablecloth for all meals?
4. What is your easy way of caring for table linen?
5. Have you established a definite way of folding sheets to make bed-making easy and motion-saving?
6. Problem: Should pillow cases and ticks show stain, what efforts on your part will cure this and prevent future stains?

CHAPTER XII

BODY LINEN

BODY LINEN—WHITE

Aprons
Chemises
Corset covers
Drawers
Dresses
Handkerchiefs
Knitted underwear
Night dresses
Shirts
Skirts
Towels
Waists

Stains.—Blood, grease, ink, iron rust, medicine, perspiration. See Chapter III.

General Methods.—Review Chapter V on general methods of washing all white clothes.

Soaking.—After removing the stains, soak the garments one-half hour in lukewarm water with soap. Soap is used with body linen to emulsify the grease that is always present on body clothes.

Washing.—Wash in clean warm water with soap. In the hand-washing process, wash on the right side, then turn and wash all garments on the wrong side. To do this, drawers, night dresses, chemises, and sleeves of waists are turned inside out and washed. Soap well the bottom hems, seams, bands, and neck, as they are thick and get the most wear. It is the inside of body clothes that is most soiled. In putting the clothes through the wringer, turn the buttons into a fold of the garment, and keep them flat, so as not to force them off, or tear holes where they are sewed. Then hold the garment out from the wringer as it is being fed into it; this will help buttons to feed in flat (See Fig. 27).

Boiling.—Soap well all bands, seams, and hems before boiling. Fresh, cold water should be used for boiling.

Rinsing.—Use hot water, then cold. Rinsing is most important because the grease and soap suds must be flooded out. Rinsing is doubly necessary if strong soaps or washing powders have been used. They are soda cleansers and to allow soda to remain in the clothes will weaken the fiber (See tests, p. 7).

Bluing.—See Chapter VIII. Garments that are lace-trimmed will require less bluing, because the softness of the lace makes it most susceptible to blue.

Starching.—A little starch in the trimming and tucks will make the ironing easier and more finished, and will help to keep the garment clean longer. It need not be stiff or scratchy. See also Chapter IX.

To Make Starch.—For the trimming the starch should be thinner than for the body of the garments:

½ tb. of wheat starch .... 1 qt. water

For body of garments use:

1½ tbs. wheat starch .... 1 qt. water

For aprons:

2½ tbs. wheat starch .... 1 qt. water

Use less of corn starch for each recipe (See table, p. 123).

To Use Starch.—Have starch strained and use very hot. Have garment wrong side out.

Starch......... Trimming and yoke of nightdress
Hems and tucks of drawers
All of corset cover with thin starch
Trimming and yoke of chemise with thin starch
Ruffle of skirt, or sometimes the lower half
All of apron
All of dress or waist with thin starch

Wring the garment as dry as possible and rub the starch in with the fingers. A well-starched garment should show no surplus starch, as whatever is not wrung out should be rubbed into the fabric.

Hanging.—Hang wrong side out and with wind:
Apron, by the band or by the hem, like a skirt
Chemise, by hem or over the line
Corset covers or brassieres, by one of fronts, or thrown over the line and pinned by middle seam of back
Drawers, by the band
Dress, by hem or wherever least strain—not at bias seams
Nightdress, by one side of lower hem
Skirt, by one side of lower hem
Waist and shirt, by bottom hem

Sprinkling.—Sprinkle the body of the underclothes well, but not too heavily. Rub the lace and trimming between the fingers, which have been dipped in water. Both hems and trimming should be well sprinkled; the hems, because they are thick, and the trimming because it is thin and likely to dry quickly.

Folding.—Lay trimming all inside and fold in the hems before folding the garment. Roll smoothly and tightly.

Ironing.—Iron embroidery on a pad and on wrong side. Iron all garments quickly, ironing smooth and dry as large a space at

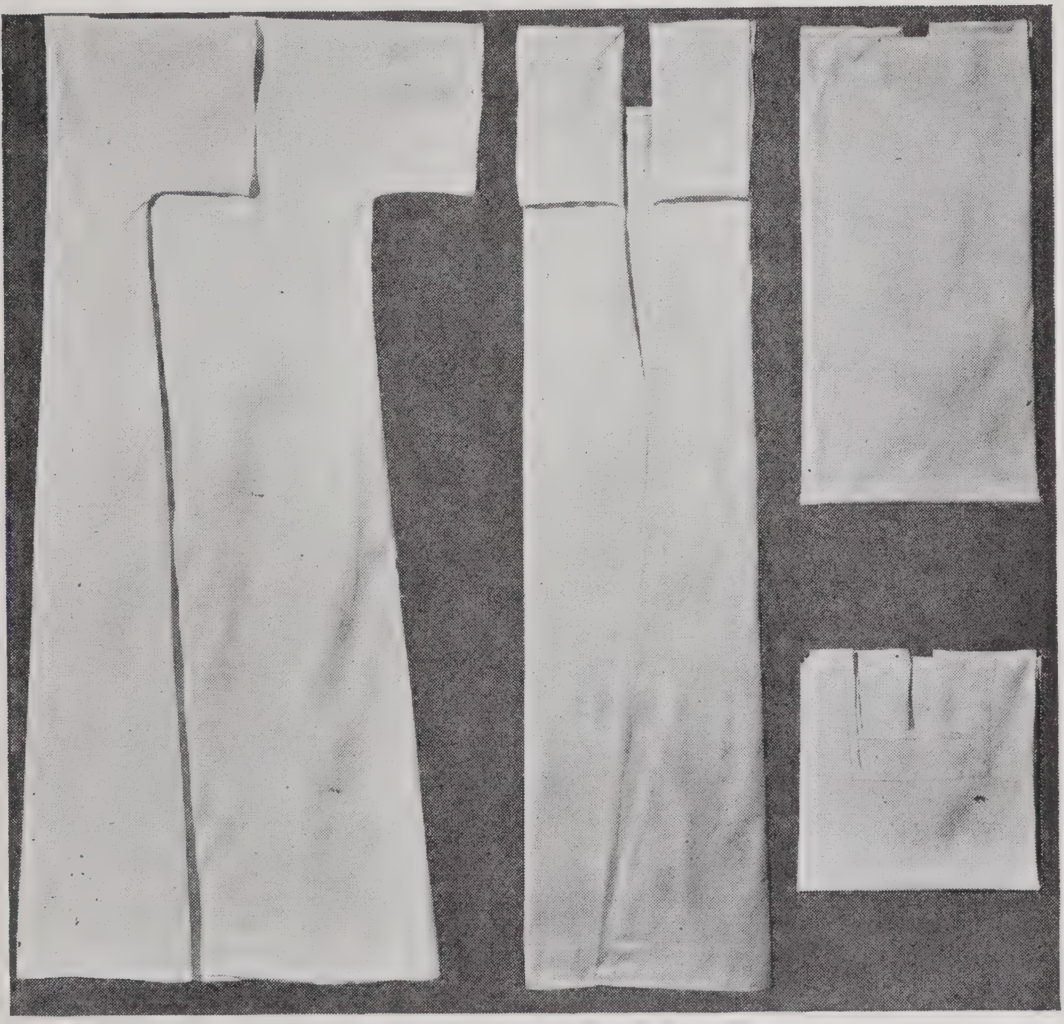


FIG. 47.—Folding night dress.

one time as is possible. Iron buttons on the wrong side. If clothes are too dry, use a piece of cheesecloth wet in clear water for dampening. This is usually for an emergency, however, as no garment will look as well as if it had been thoroughly sprinkled at the beginning. To do this too often may cause the garment to yellow, because the excessive moisture may produce iron rust from the iron.

NOTE: The garments suggested below vary in name and style from time to time, but the same principle may be used for the modified garment as for its original.

In ironing a nightdress, iron the embroidery and tucks on the sleeve, then the sleeves; then iron the yoke, the body of the nightdress, running the iron well into the gathers, and then fold (See Fig. 47.)

Nightdresses, corset covers, and chemises may have the body part ironed double like a pillow slip. For folding of chemises (and corset covers) see Figs. 48 and 49.

In ironing drawers, iron the trimming, the tucks and the band. Then the body of the leg piece may be folded and ironed double. For folding, see Figs. 50 and 51.

Corset covers and camisoles should be ironed with a smaller iron, which will get in between the seams.

In ironing skirts, the ruffle is ironed first, so that it may be laid back without wrinkling while the hem of the skirt is ironed. Should one want the ruffle plaited, that may be done at regular intervals as the ruffle is ironed. Iron the band, then the body. Do not fold the skirt at once, but hang to dry, as the folds are usually damp.

Aprons will hang better if ironed lengthwise from hem up to gathers, rather than crosswise from hem to gathers. Bibs and strings should be ironed before the skirt of the apron, and will look better if ironed on both sides, by ironing half dry on wrong side and finishing on right side. For folding, see Fig. 52.

Waists should have sleeves ironed first, as they will hang out of the way while the rest is being done. Sleeves should be ironed without creases at the front and back. Next, iron under-arm piece on each side, then either front or back, whichever is in two pieces. The fronts will set better if ironed from shoulder down. Ironing upward will cause plaits or folds at the shoulder. Ironing around or across the yoke will make yoke bulge. For folding, see Fig. 53.

Handkerchiefs are ironed the same as napkins.

Towels, with the exception of any that have non-fast colored borders, are washed and boiled as body linen. They are ironed on both sides and folded in three lengthwise folds. Finish with the middle third out, unless the marking requires otherwise. The marking should be out.

Shirts are well prepared for ironing by the special starching

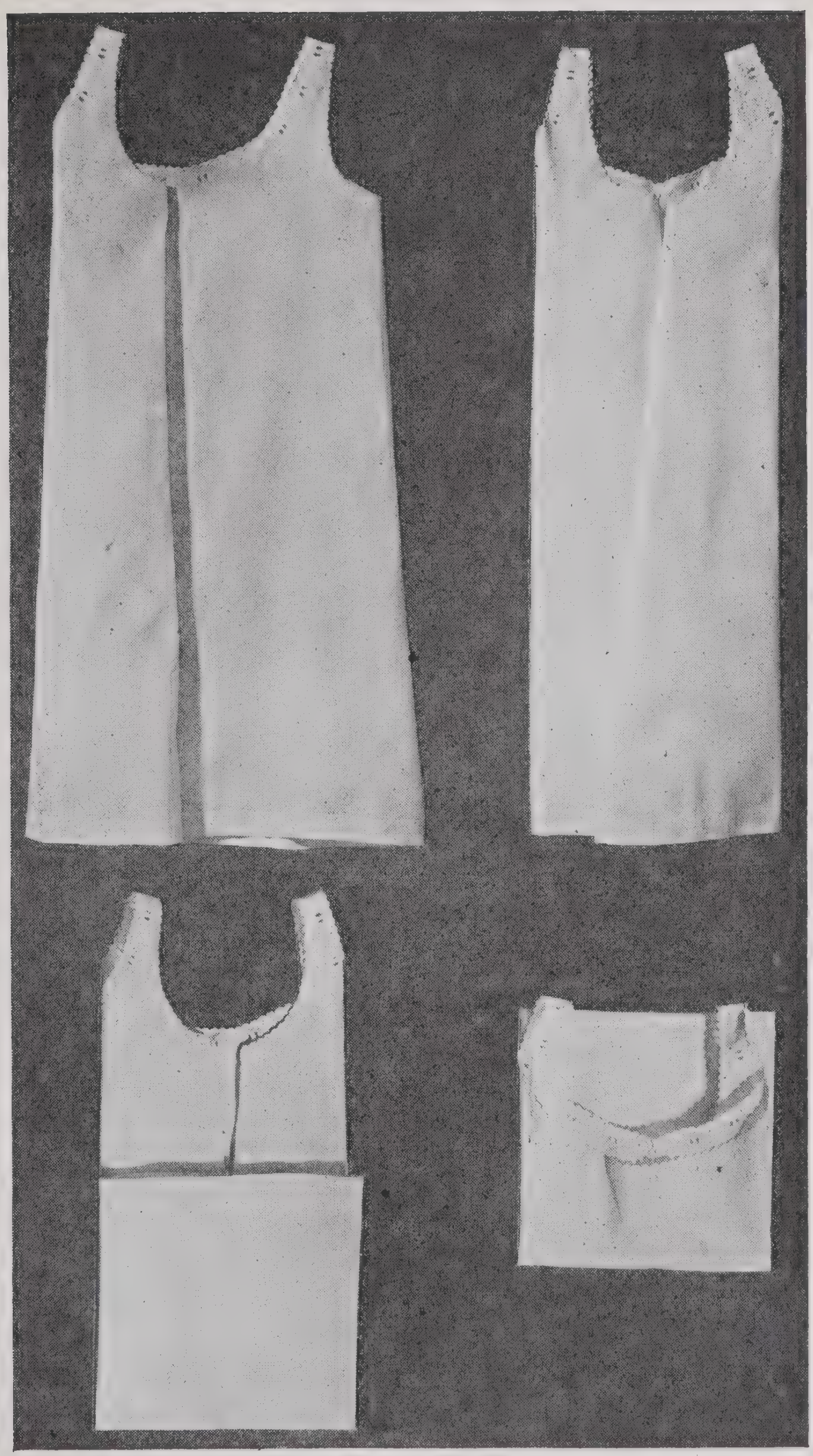


FIG. 48.—Folding chemise.

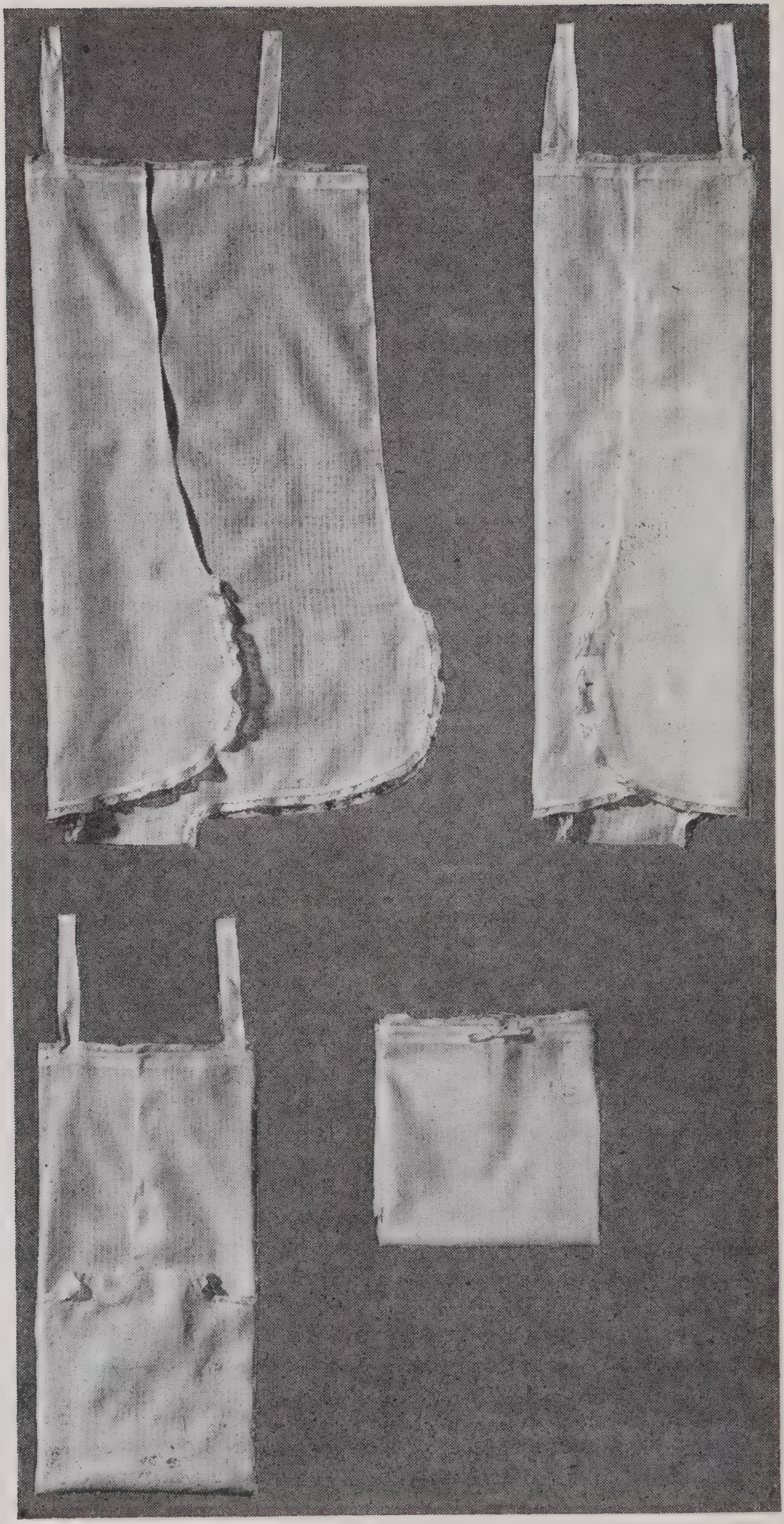


FIG. 49.—Folding chemise.

which precedes, as stated on p. 119. The iron should be hot, smooth and clean; the shirt bosom thoroughly damp, not wet. Iron the neck band first, then down from the neck to the lower end of the bosom. This rule holds for plain and plaited bosoms alike. Iron until dry and perfectly smooth. The glaze from the hot iron and starch may be wiped off with a damp cheesecloth; a bone paper-cutter or any dull, flat surface will open the plaits. For folding, see Fig. 54.

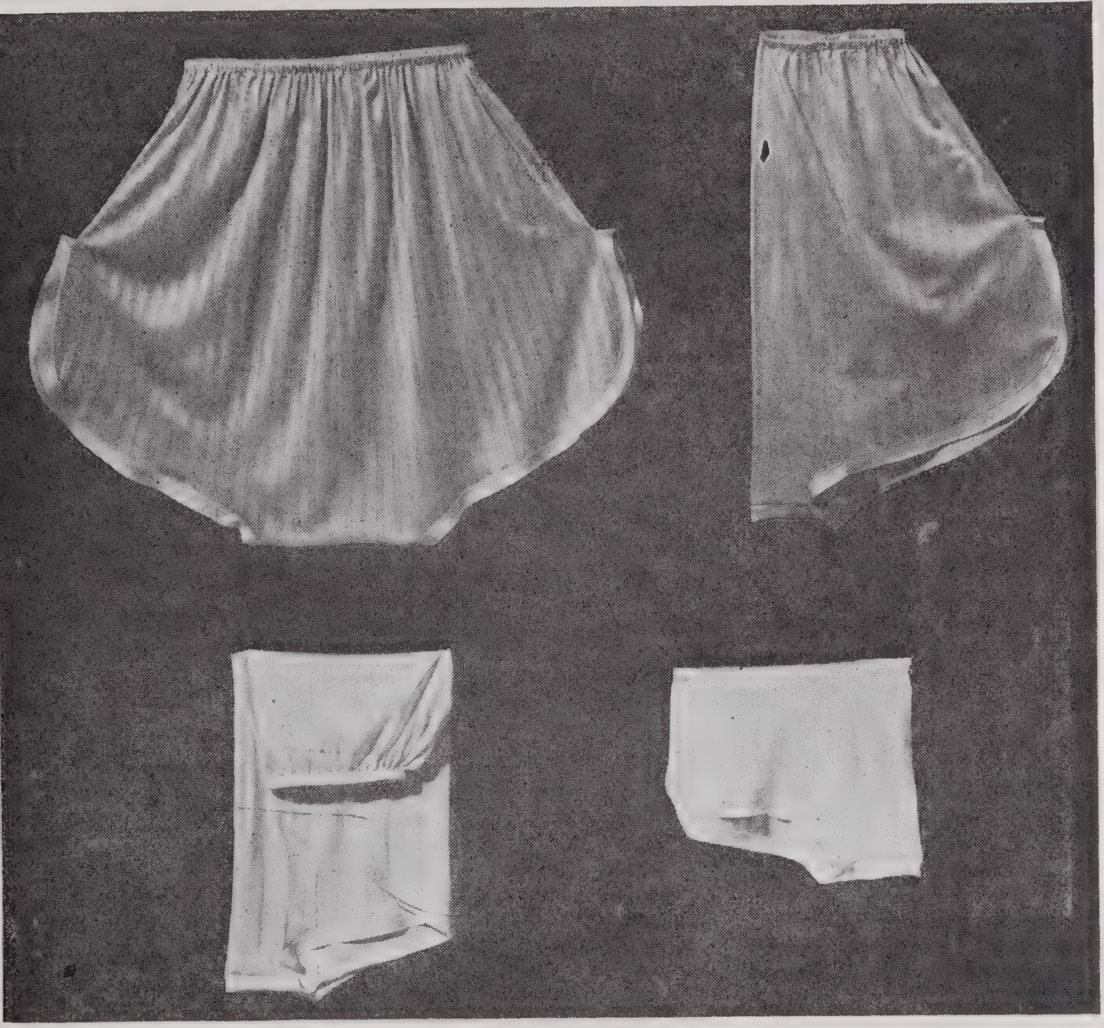


Fig. 50.—Folding bloomers

Collars and cuffs are ironed like shirt bosoms, and are best done by ironing half dry on the wrong side, and then entirely dry on the right. The glaze or polish can be removed from them in the same way as from a shirt front. To shape collars and cuffs with a flat iron, press firmly with the heel of the iron and roll the collar or cuff over close after the iron; hold a minute until the collar or cuff is rolled. To turn turn-over cuffs and collars, when finished run a moist cloth, which is held over the end of the thumb, along the line of the fold. Turn over the collar or cuffs or points while still damp,

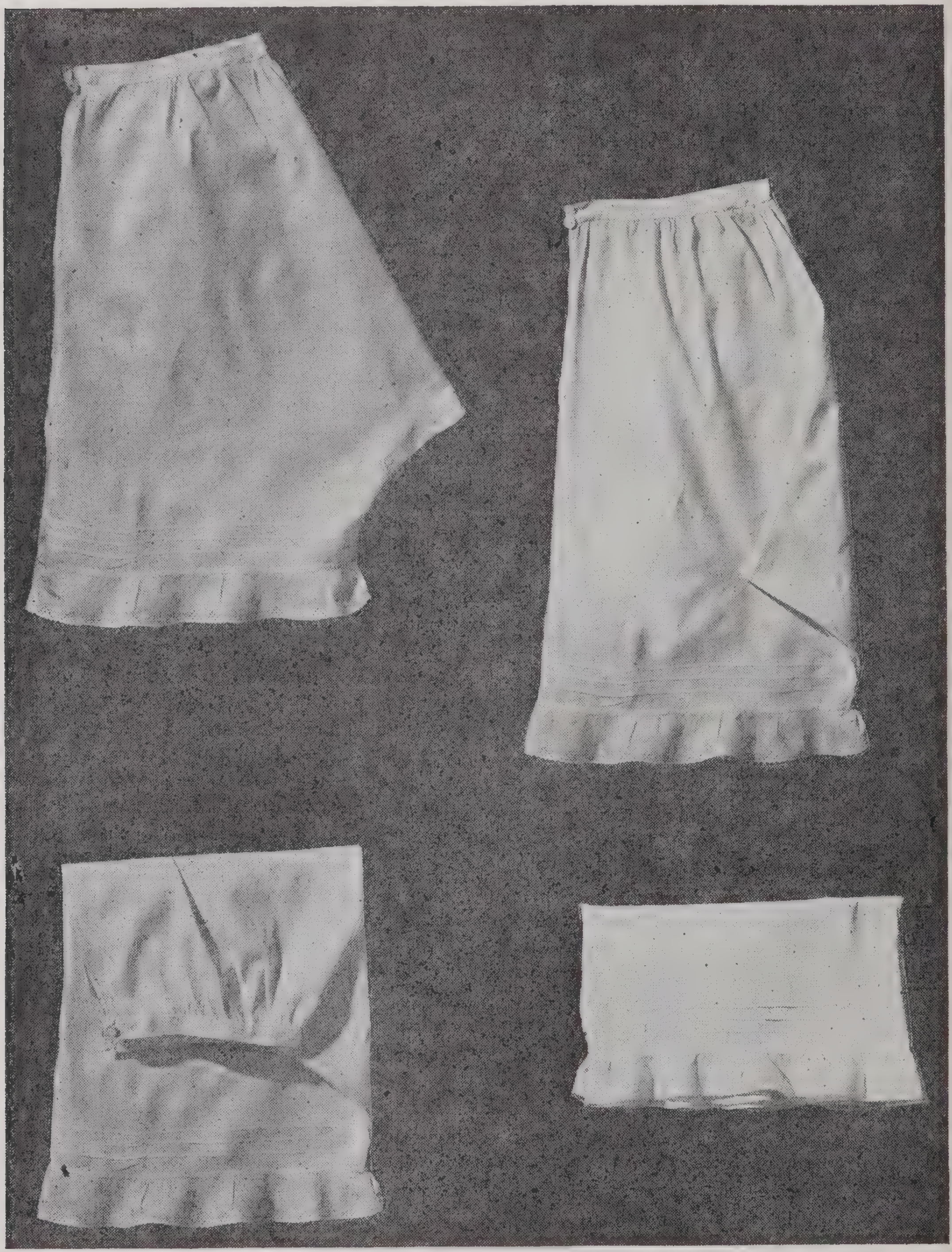


FIG. 51.—Folding drawers.

and press on both sides with the iron. To rub this fold, before ironing, with a cloth wet in starch water may smooth the fold and give it a good finish, similar to that which the collar and cuff ironing machine produces.

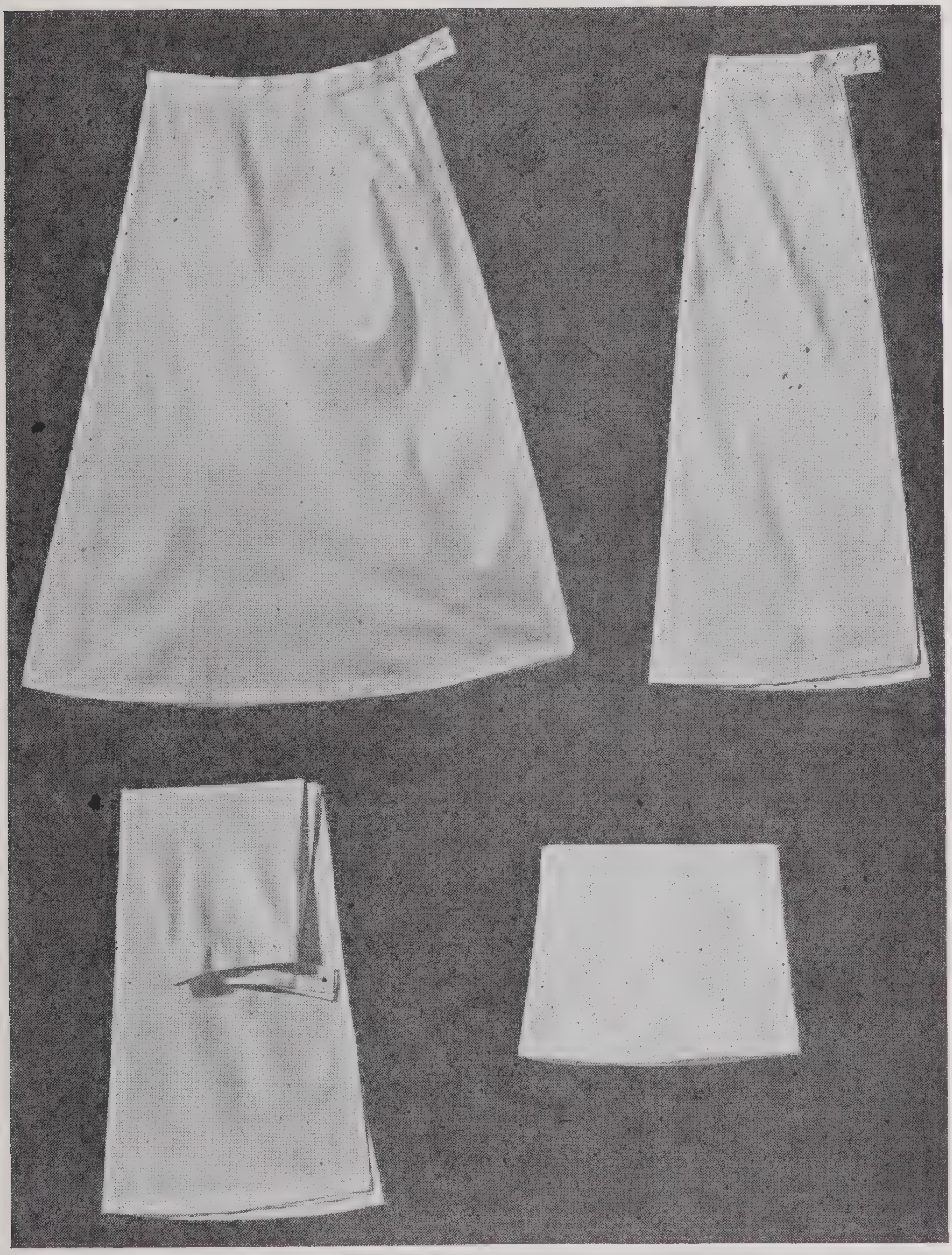


Fig. 52.—Folding apron.

Machine Ironing.—If buttons and gathers are eliminated through choice of pattern, many body garments can be well done on the regular flat-work ironer. Shaped aprons and kimono nightdresses without fullness are examples. The hot cylinders and the heavy pressure of the ironing will give such garments a crisp, starched appearance. They should not be starched, however, as it is not wise to feed starched clothing into a flat-work ironer.

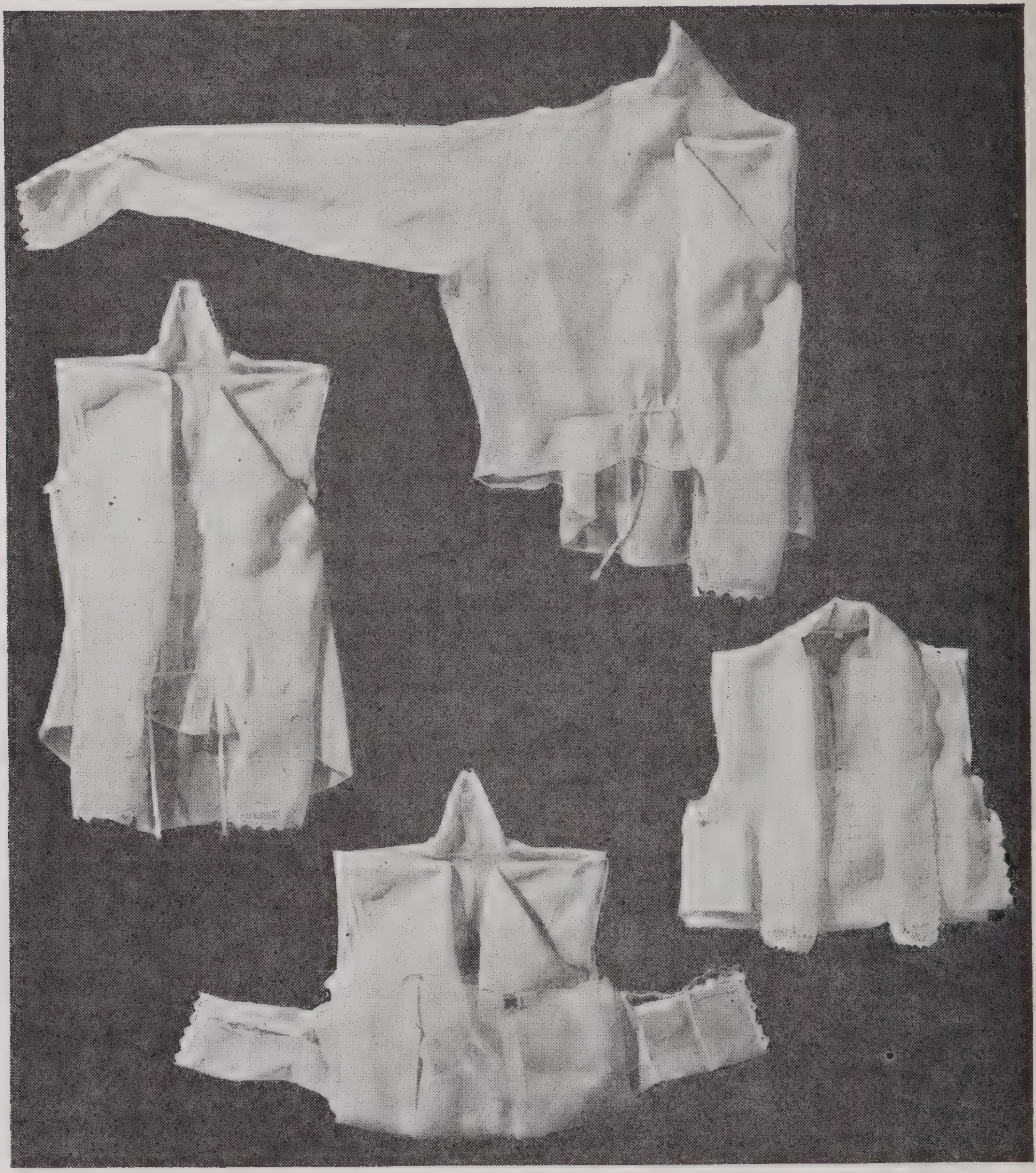


Fig. 53.—Folding lingerie waist.

Knitted Underwear.—Knitted cotton underwear may be washed with the white clothes. Wash it on the right side, then on the wrong side. In hanging it to dry, pin by the shoulders. Stretch and pull it into shape as it dries. Much shrinkage can be avoided by this careful shaping. It is better not to hang knitted underwear, even all-cotton, out of doors in freezing weather.

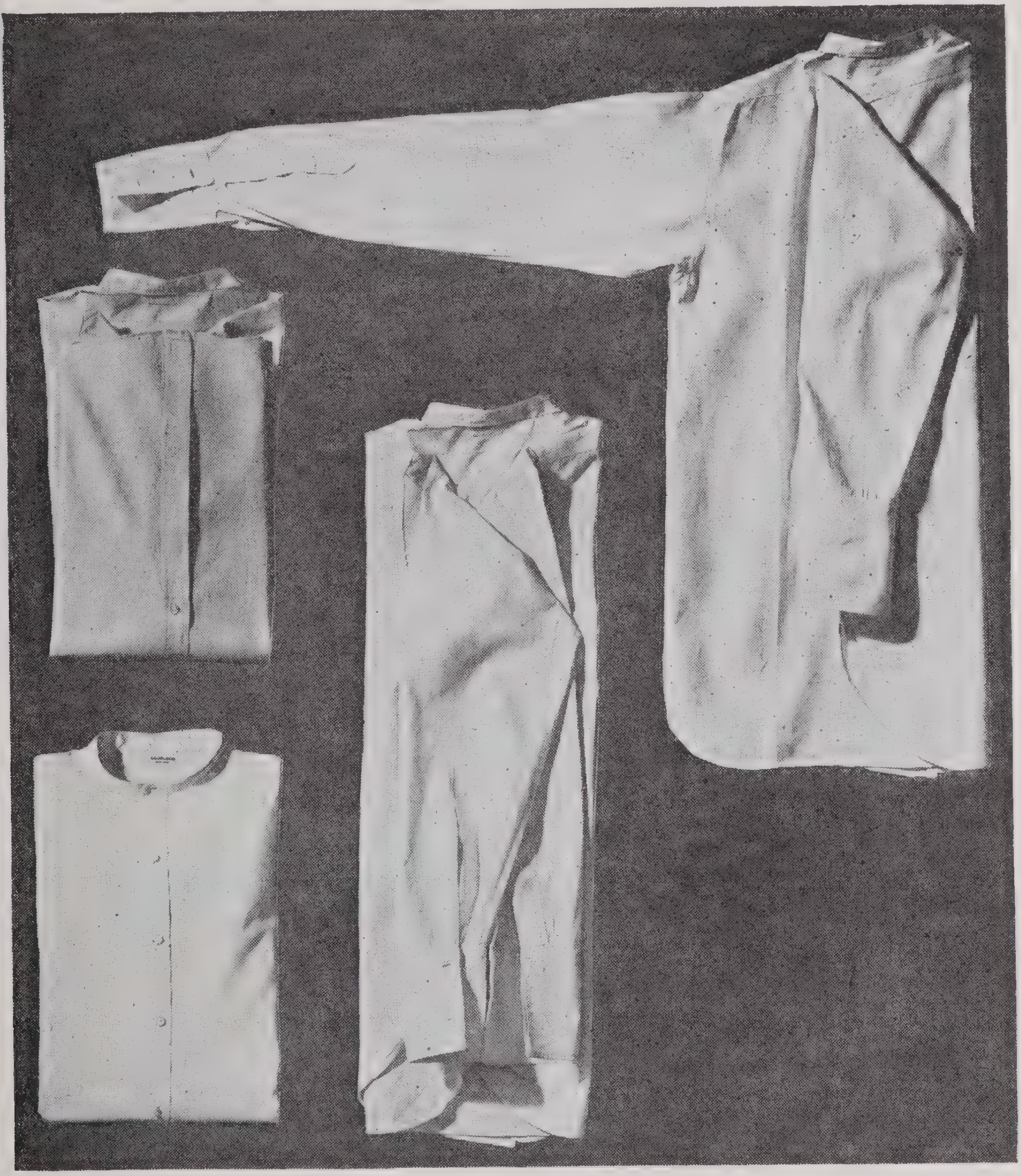


FIG. 54.—Folding man's shirt.

Pressing with a warm iron helps in the shaping of the garment, and makes it softer. These garments may be ironed in the flat-work ironer, if one is careful. Feed them in shoulder first, spreading them at the crotch as they go through. Put them through the

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ironer once, then hang them to dry. Be careful not to leave them too long in a heated drier, or they will be yellowed.

For the washing of woolen underwear, see p. 159; for silk, p. 170.

Stockings.—Stockings should be washed in clean water, and not in water which is full of lint from other clothing. Wash on the right side, giving special attention to the foot; turn and wash on the wrong side. Stockings require thorough rinsing, and should be hung by the feet to dry. Brown stockings should be washed by themselves, as they usually "bleed" considerably. Silk or woolen stockings should be washed as any silk or woolen garment (pp. 159, 170). Stockings may be pressed with a warm iron on the wrong side.

Diapers.—Cloths of this nature should be put to soak in cold water as soon as used. To wash, use a good soap and warm water; then boil, rinse thoroughly, dry in sun and air. Ammonia is better than washing powders or washing soda, as these alkaline substances may remain in the fabric after drying and irritate the skin. There is no reason against boiling the cloths with good soap if they are well rinsed afterward.

Questions

1. Make a study presenting the various ways and means by which the cost of laundering may be reduced while traveling.
2. How would you wash children's socks having colored stripes?
3. How do texture and weight of fabric affect the ease of laundering cotton body linen?
4. Problem: Using three garments of the same kind, but of different degrees of elaborateness, make a cost study of their laundering, based upon commercial laundry prices.

CHAPTER XIII

COLORED CLOTHES

THE washing of colored clothes presents a double problem, for we have to consider not only the nature of the fabric, but also the color of the garment. Years of experimentation with dyes have brought much knowledge to textile workers, with the result that the dyer has succeeded in finding many fast dyes. The fastness of the dye depends not so much on the dye recipe as it pertains to the proportion of various dyes used; but upon the fact that some dyes, known as direct dyes, combine with materials like wool and silk, while others adhere to the fabric. Those that adhere to the fabric, as in the case of cotton and linen, are naturally freer to leave the fabric. The softness and absorbing power of fabrics play an important part then in the dye. Also, cloth dyed in the thread is likely to be more lasting in color than when dyed in the piece or when the color is stamped on. Patterns in colors are either woven or stamped like stencils. The poorer way of making patterns is to bleach white spots on a solid color. This naturally reduces the strength of the cloth wherever the bleach has been applied. See *Dyeing,* Chapter XVIII. Wise forethought in choosing colors for washable garments will do much to simplify this problem. But even the best of colors demand more care in laundering than do plain white clothes.

General Rules.—The wisest plan for washing colored clothes is to establish the rule that will best suit all conditions, then to run no risk by attempting what may seem a quicker method. The following are essentials:

Set the color if the color begins to bleed.

Use warm water, not hot.

Use soap free from alkali and in solution.

Wash and rinse quickly.

Hang away from sunlight, or roll in layers of white cloth, sandwich fashion.

Do not sprinkle and roll.

Do not use too hot an iron.

These rules, if followed, will bring the best results.

Stains.—The stains on colored clothes are hard to remove because the chemical will probably remove the color, too. Often a white spot is less noticeable than the stain—this must be decided by the owner. Stains on white goods with stripes or figures can be more easily removed by applying the chemical with a dropper between the stripes or pattern and quickly washing. To prevent the chemical from spreading into the stripes, it will be found possible to protect them by applying a little soap to the stripe. This acts as a bar over which the chemical cannot easily spread. Quick rinsing is the best precaution. If one has a small piece of goods to test, apply a drop of oxalic acid to such stains as ink and iron rust and wash instantly. In many cases this does not harm the color and will take out the stain. In removing stains from colored goods, the greatest chance for success is gained by following the rule—*many short applications give better results than one long-continued one.*

To Set Colors.—One must determine quickly whether the first color that appears in the wash water is "bleeding" of dye or whether it is a flush of dye from the insufficient washing of the fabric when it was dyed. If it is a flush of color, it rarely carries over into a second tub of cold water, and the color of the fabric will be clearer than it was at the beginning. Before using any mordant (as a substance used to set colors is called), try to prevent the bleeding of color by reducing the temperature of the water. Many times the damage is done by the heat of the water rather than by the action of the soap.

Salt is a good mordant and should be at hand to use if the color really bleeds. To use salt on every color without first testing the bleeding is not necessary; in fact, it is a hindrance, as salt checks the formation of the suds. The alkalinity of the salt produces a hardness of the water which causes it to resist soap and to form a hard water scum. Always use as soft water as can be obtained. No definite proportion of salt can be given, except that in most cases two cups of salt to one gallon of cold water will be enough. More may be added until the bleeding stops. However, before adding so much salt, lower the temperature of the water to cold if necessary. Salt may be used for all colors, but is most effective for browns, blacks, and pinks. *Vinegar* is a good mordant for blues—use one-half cup to one gallon of water. *Sugar of lead (poison)* is best for lavenders—use one tablespoon to one gallon of water. Be careful of this poison. Its success hardly warrants its danger. Setting color once does not always insure permanency.

NOTE: The author rarely finds any need for salt or poisonous mordants if the water temperature is reduced, and if the washing is done quickly.

Washing.—Wash the garment as quickly as possible in warm water to which has been added enough dissolved white soap to make good suds. This soap should be free from strong alkali. Because of the soda in most washing powders, they had better not be used for colors. If the color seems especially sensitive, avoid all soaking and as much rubbing as possible. Rubbing oftentimes blurs the pattern (Fig. 55), so it is more satisfactory just to squeeze the garment in soap suds. It is over-wear which produces so much soil, with the result that it will require extra time for washing, extra rubbing, and more soap, all of which is hard on color. After washing, rinse quickly in two or three clear waters. Putting salt in the last water may brighten the color. Pinks, lavenders, greens, and yellows should not be blued. Do not boil colored clothes, or at any time use water hotter than the hand can bear comfortably. Better work will be accomplished by washing clothes of one color at a time than if dif-

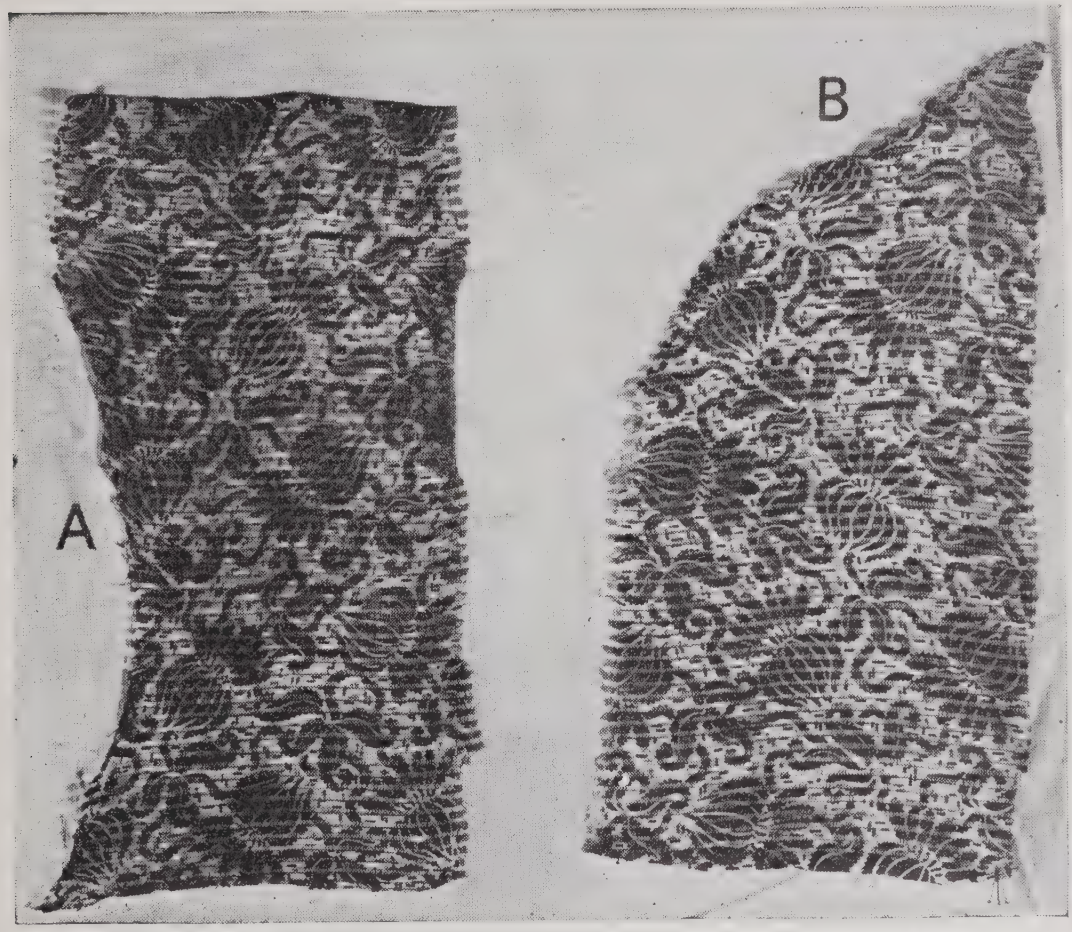


Fig. 55.—Colored fabric washed by two methods: A was rubbed, B was not.

ferent colors are combined. For example, if reds and blues are washed together, the blue may take on a purple tint.

If it is necessary to wash colors in a machine, it is better to use laundry nets and combine like colors in one net. Do not crowd the net too full. The thickness of the net cord does much to keep one color from running into another.

Colors may be reëstablished by using the various commercial tints which come as powders or as soaps. The main consideration is to match the color and to remember that colors of patterns cannot be treated without affecting the background of the fabric. See Chapter XVIII.

Colored Silk Underwear.—Where silk knit underwear is colored, it is necessary to use double care. The color of a pink garment will usually drop in the first and second washings. For all such garments lower the temperature of the water. (See also p. 170.)

Starching.—The starch for colored clothes cannot be hot, as for white clothes. The garment should be wrong side out, and the starching should be done as for white clothes, keeping like colors together. For the best starching of colored clothes, it is wise to divide the starch, so that blue garments will not need to be starched in pink starch, or *vice versa.*

Hanging.—Colored clothes should be hung in the shade to dry. A quick drying will prevent colors in striped and figured goods from running and spoiling the background. When the dye seems uncertain, or one wishes to be especially sure to protect a color, lay the garment between cloths to take up the extra moisture. With a layer of white cloth and a layer of colored cloth, sandwich fashion, the garment should be rolled and left until dry enough to iron. This applies for either starched or unstarched goods, cottons or linens, wools or silks.

If the garment is a heavy one, such that rolling would cause it to dry too slowly—which is detrimental to colors—hang it so that no two thicknesses touch each other. For example, hang sleeves away from the waist. Many times it is wise to stuff the sleeves in order to prevent the layers of thick material from touching one another. Double bathrobes often hold water at the sewing of the hem; it is safer to rip out the hem; or the garment can be hung with the hem upside down, though this is not always sure in its results. Persistent bleeding of color can be to a great extent helped by rolling the fabric in heavy absorbing cloths to take up all possible moisture before hanging the garment to dry.

Ironing.—Colored clothes should be ironed on the wrong side, or on the right side with the use of a piece of cheesecloth as a cover over the fabric. This cheesecloth will prevent the shine which is often seen on seams and tucks where there is a double thickness. A cheesecloth cover is especially necessary for silks. Do not use too hot an iron, remembering that heat helps to fade color.

Old muslins should be put on the ironing board when ironing colored clothes, in order to save the good covers. The heat of the iron may cause the color to bleed even though it did not show such tendency in the wash water.

Soap Substitutes for Colored Clothes.—Where the color seems uncertain, soap may be eliminated entirely from the cleaning, thereby eliminating all risk of the color being affected by alkali. If water can be used at all, substitutes such as bran water, soap bark, or starch water may be used. If water cannot be used, then dry cleaning is the only process that will protect the color. For methods of dry cleaning, see Chapter XVIII.

BRAN WATER

4 cups of bran   1 gallon of water

Cook the mixture twenty minutes, and strain. Add half of the strained solution to the first wash water, the second half to a second wash water.

SOAP BARK

4 cups of soap bark   1 gallon of water

Cook twenty minutes, and strain. Use in the same way as the bran water.

STARCH WATER

3 tablespoons of raw starch   1 quart of water

Mix, and use without cooking.

In using these substitutes, the clothes will not be rinsed after the second washing. There will be enough starch in the bran water and in the starch water to give sufficient dressing to the fabric, if the garment is ironed without drying. Soap bark gives no stiffness.

Gum arabic may be used as a starch substitute for stiffening. It will give dressing to the fiber without the gloss that starch gives.

Gum arabic gives the best results when used for veilings, crêpes, and fine silks. See Chapters XV, XVII.

Questions

1. What special points must be remembered in removing spots from colored garments?
2. What are the disadvantages of setting dye in fabrics?
3. What is the special value of soap substitutes for washing colored clothes?
4. How is starch prepared for colored clothes so that the color does not bleed?
5. What part does heat play in the laundering of colored fabrics?
6. Problem: By a study of samples of various colored fabrics, establish the temperature of wash water at which color is likely to bleed.

CHAPTER XIV

WOOLENS

Wool must be considered a delicate fiber because it is an animal fiber, and, like all animal tissue, is sensitive to heat, friction, and alkalies. The fiber is covered with minute scales that overlap. Any change of temperature causes the scales to fold over on themselves and so shorten; friction knots the fiber by twisting and turning the scales. In either case the wool felts or thickens and shrinks. Strong alkali dissolves the wool, making it at first tender, then finally causing it to disappear (See pp. 4, 7).

General Rules.—These three facts give us our general rules or principles to be followed in washing all woolens, whether white or colored:

1. All waters should be of same temperature—about 110° F.
2. All rubbing or twisting should be eliminated.
3. Only mild soaps (containing no excess alkali) should be used.
4. Soaps should be used in solution—to prevent rubbing.
5. Borax and ammonia may be used to soften water, as they are too mild to injure wools.
6. Cottons embroidered in wool will have to be washed as woolens.

Stains.—To remove stains from wool, one is somewhat hindered if a bleach seems necessary. Dilute acids do not injure the fiber, so lemon juice, dilute oxalic, or dilute hydrochloric acid may be used for ink and iron rust; but dye or certain stubborn stains, which might otherwise be easily bleached out with Javelle, or potassium permanganate and oxalic, must be treated with care. Javelle, being an alkali, would, in time, dissolve wool, and usually Javelle and permanganate will yellow white wool. But if dilute acid is applied to the spot first, followed by Javelle, the bleach is allowed to work without having opportunity to discolor the wool, provided the work is done rapidly and enough acid is used. Oxalic acid and sulphur fumes are the safest bleaches for stains on white wool. See table of stains, pp. 33-42, also p. 164.

Any chemical will destroy color in wool and silk, as it will in cotton and linen.

Washing.—Woolens should be brushed or shaken to free the loose dirt; pockets or cuffs turned inside out and brushed. Have water of tepid temperature, and the soap dissolved by itself. Add enough soap solution to make good suds. Wash the garment by a squeezing motion (sometimes called sousing), and as fast as the water becomes soiled, change to another which is soapy and of the same temperature as the first. To remove persistent spots of soil, rub some soap solution directly on the spot with the palm of the hand. Do this work thoroughly, as quickly as possible, and without any lifting or pulling which will stretch the garment—a precaution especially necessary with the knitted type (Fig. 56).

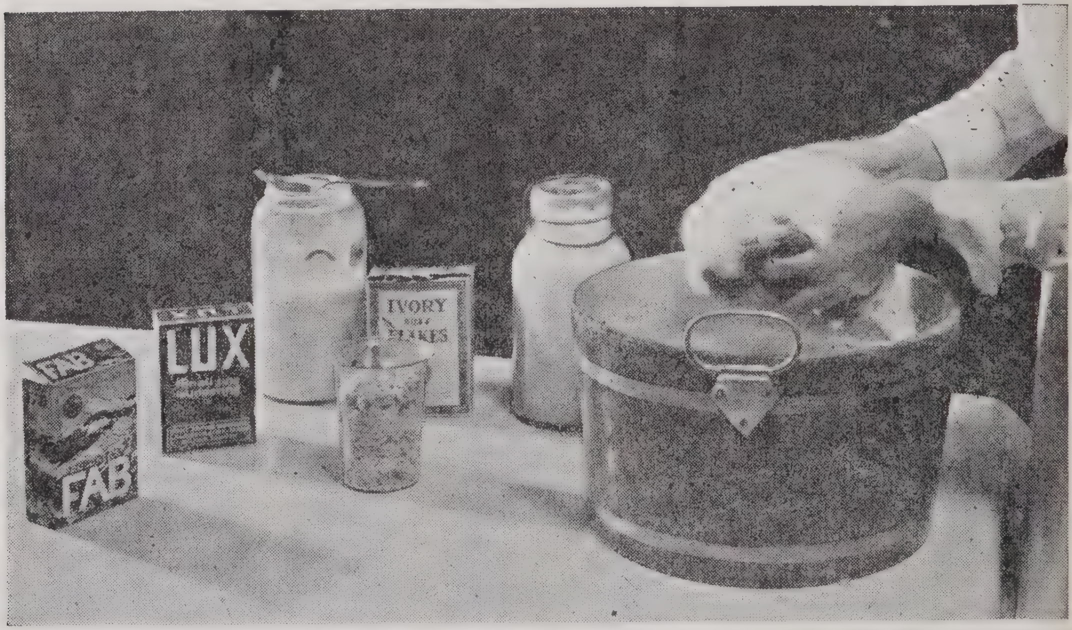


Fig. 56.—Washing knitted woolens

If a garment has become over-soiled and is hard to clean, put one cup of detergent with the soap solution into the last wash water. The ether in the detergent will dissolve the grease that holds the soil. A little borax—one-half cup to the tub of water—in the last rinse will clear up the white wools. Woolens should be rinsed, as there is no special point in drying soap in them. The wringer is best for wools, as it presses out the water; however, the pressure should be light enough to avoid strain on the garment. In wringing, hold a sweater (assistance will probably be needed) so that it is not stretched. In the absence of a wringer wools should be squeezed dry. Do not wring by twisting.

If the garment has been ripped up to be washed, be careful to hang the various lengths straight. Press on the side that is to be the wrong side when the garment is made up.

If a woolen garment has been dry-cleaned several times before washing, it will be impossible to get a clear white color. Sulphur bleach (p. 164) will help in this case. Be sure that this sulphur bleach has some protection to prevent fire.

Soap Solutions for Woolen Cleaning:

BLANKET WASH

1 large bar mild white soap
or
9 oz. of white soap chips
3 qts. cold water
2 tbs. borax
½ cup alcohol (denatured may be used)

Soap chips may be used in place of a shaved cake of soap. The amount must be equivalent by weight. Heat the soap in one quart of water at a low temperature until dissolved. Then add the remaining water (cold), borax, and alcohol. Bottle in large-mouthed jars.

Add blanket wash to warm water sufficient to cover the garment to be washed. Let the garment stand a few minutes to loosen the dirt. Wash with a regular squeezing motion. Be very sure to do this work regularly, avoiding streaks. As fast as the water soils, prepare new soap suds, always of the same temperature. Rinse until water is clear.

DETERGENT

1½ oz. white castile soap
1 oz. alcohol
1 oz. ether
4 oz. ammonia

Cut soap fine and heat in one pint of soft water until dissolved. Do not boil. Then add three quarts of cold water and other ingredients. Keep tightly corked in bottles.

SOAP SOLUTION

1 cake soap
or
9 oz. soap chips
2 qts. water

Shave soap and dissolve in water.

Borax may be added to the wash water or to the plain soap solution if woolens are very soiled (See p. 129).

Drying.—To consider drying, divide the wools into two classes—knitted and woven. Knitted garments such as sweaters should be laid on a pad to dry. The shape and size can be best checked up by measuring the shawl or sweater or petticoat before wetting it (Fig. 57). These measures should be written down and the wet garment shaped to them (Fig. 58). The pad should be made of several thicknesses of bath towels, a folded sheet, or any soft, absorbing material. Knitted underwear should be hung by the shoulders, and pulled to shape while it is drying. Baby shirts and woolen stockings may be dried on wooden forms to prevent shrinkage.

Woven garments should be stretched and shaped. A blanket may be put in curtain stretchers, or one-half over the line so that the edges may be pulled straight. This is better than hanging single, as the weight of water in the larger portion is so great that it causes the corners to sag. If the blanket is turned half round when it is partly dry, it will be less likely to sag at the corners.

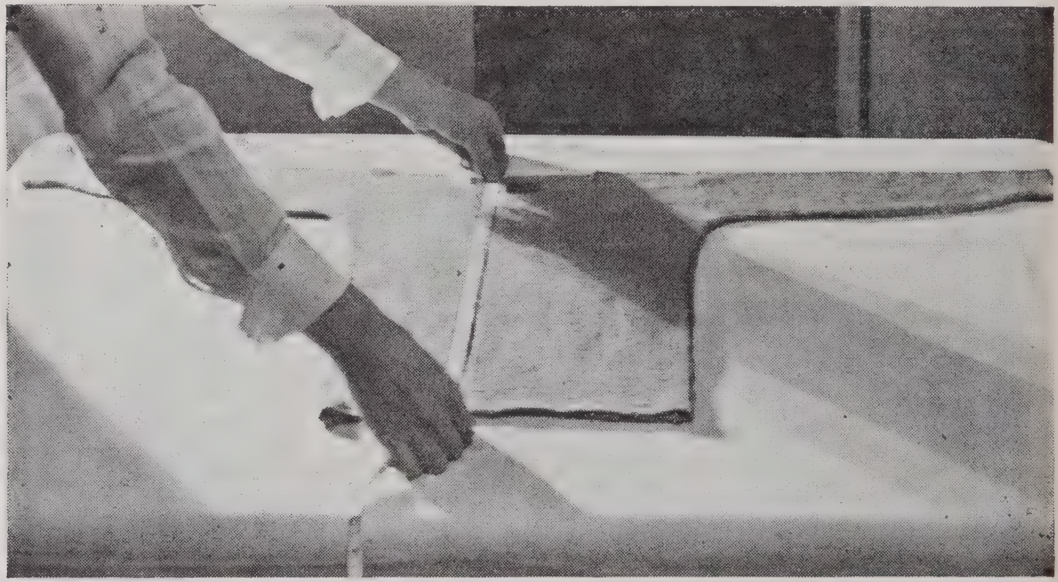


FIG. 57.—Knitted woolens measured before washing and shaped to the same measures.

Brushing the long fiber wool, such as Angora, while it is drying will fluff it and to a degree card the wool. Using a stiff whisk broom, brush both sides, brushing always the same way. The blankets that have been finished by the modern felting process are to be washed in the regular way, but cannot be brushed.

Dry wool garments in a moderate temperature—not in the sun—and do not allow them to freeze. Sun burns the white wool; freezing causes shrinkage.

Skirts and trousers should be hung by the band, and pulled so that the entire bottom line is even. This is best accomplished by hanging by the band in a trouser hanger or by pinning the garment

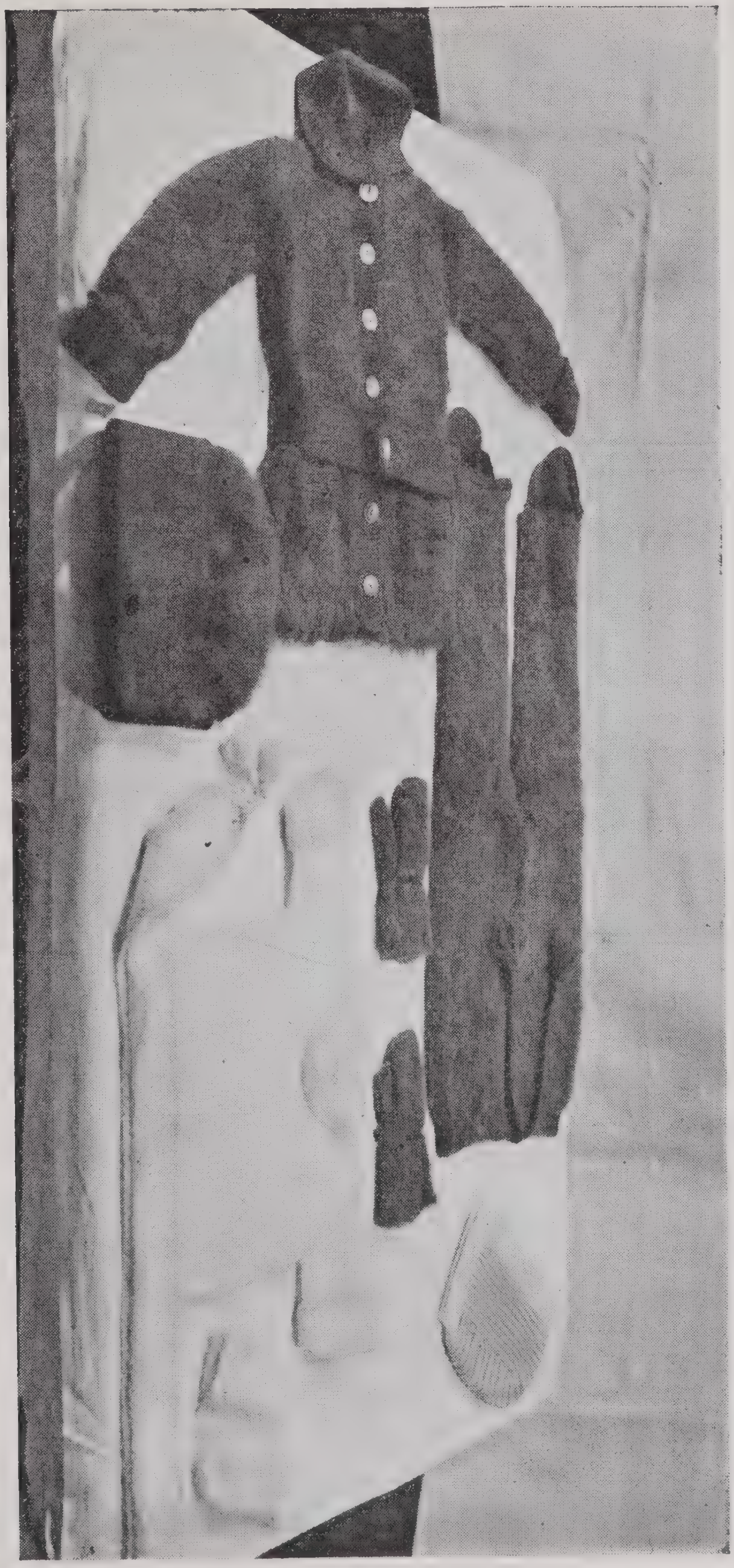


Fig. 58.—Drying woolens on pads in the shade

close to the line, with the waist band stretched to prevent sagging. If a trouser hanger is used, fold a white cloth about the skirt to prevent the hanger from leaving a mark.

Bleaching.—Woolens must be bleached with great care, and with the home facilities, results are more or less uncertain. Peroxide may be used as a bleaching liquid. Peroxide is acid as taken from the bottle, so a few drops of ammonia or borax should be added to neutralize the acid. Use one part of peroxide to fifteen parts of water. A sulphur candle, a clean barrel, and a pan of water will make a bleaching outfit if one has good outdoor facilities. The garment should be clean and damp. Stand the sulphur candle in an old pan which floats in a pan of water in a barrel, light, and let burn. Spread the garment out on several strands of heavy white twine, and suspend hammock fashion a few inches below the top of the barrel. Tack these strands securely to the barrel. Cover with heavy, clean paper, then with a heavy covering of old carpet or blanket. The fumes of sulphur will pass up through the wet wool. At the end of an hour note change. The time depends on the degree of discoloration to be removed. Working in the open, one need not inhale any sulphur fumes (See p. 23). If any bleaching is done with potassium permanganate, the solution used must be very dilute in order that the acid may easily bleach out the color left by the permanganate.

Ironing.—Ironing of woolens is more like pressing than like regular ironing. As the fiber scorches so easily, and the heavy seams glaze under the pressure of the iron, it is advisable always to use cheesecloth between the cloth and iron. Pulling the cheesecloth off makes the nap fluffy. A garment half-dry when ready to be ironed will give better results. Otherwise, cheesecloth should be dampened each time. For the pressing of woolens such as coats, trousers and heavy skirts, choose a heavy iron, and have pieces of muslin which are large enough to cover the entire surface of wool as it lies on the board. Wet the muslins each time and iron with hot irons until the wet cover cloth is entirely dry and the wool underneath no longer steams. Should any gloss appear from ironing, rub it with a damp cheesecloth and do not iron again.

Colored Woolens.—Observe all points stated for white woolens, and note one additional problem—the fading or bleeding of colors. (See *Colored Clothes,* p. 153.) Do not use salt for woolens if it can be avoided, because the hard water produced is not good for woolens.

Dark colored serges, gabardines, or broadcloths may be washed without risk of losing colors by using soap bark instead of soap, and always using cooler water than usually used for laundering. For recipe for soap bark, see p. 157.

Questions

1. To what extent is it possible to bleach woolens? Why not sun bleach?
2. How far is it advisable to hold to a principle in trying new soaps or new recipes in washing woolens?
3. Should a woolen garment show inclination to bleed color, what precautions are the safest to use?
4. Problem: A heavy blanket wrapper is interlined with a contrasting color, bound with satin and trimmed with heavy cord. How would you proceed to wash it and prevent streaking of colors?

CHAPTER XV

SILK

SILK, like wool, is an animal fiber (See p. 5). It does not shrink like wool, since it is a continuous thread without serrations, but it is easily harmed by friction, heat, and strong alkalies. It is less strong when wet than when dry, therefore it may be weakened by careless washing. It scorches readily, consequently cannot be subjected to extreme heat either of wash water or of iron. Moreover, a hot iron stiffens and cracks silk. Alkalies will eventually dissolve the fiber, so safety demands that they be eliminated from the washing of silks.

General Rules.—We may sum up the rules concerning the laundering of silks—whether woven, pile, or knitted—as follows:

1. The water should not be too hot—about 110° F.—lower if garments are colored.
2. Do not use salt to set color until lower temperature of water has been tried.
3. Use no strong soaps or alkalies.
4. Use no friction in washing.
5. Do not use an iron that is too hot. Protect the garments with a layer of cheesecloth.
6. Combination fabrics or garments of silk and cotton, or silk and linen, must be washed as though all silk.

To Remove Stains.—The same limitations in stain removal apply to silks as to wools. Since alkalies, with the exception of ammonia and borax which are very mild, weaken the fiber, they cannot be used to bleach out stains. Dilute acids, used with care, do not harm silks, therefore stains which are soluble in these reagents may be removed. For instance, lemon juice, citric acid, dilute oxalic acid, or dilute hydrochloric acid may be used for ink and iron rust. This applies, of course, only to white silks. Absorbents may be used for grease spots. Peroxide may be used for bleaching silks, but should be neutralized with ammonia or borax. See also table of stain removal, pp. 33-42.

Washing.—Have the temperature of the water not over 110° F. Add soap flakes or soap solution to make good suds. Cleanse the garment by dipping and squeezing it in the suds. If the garment is very soiled—better wash it before it becomes over-soiled—wash it in a second suds, then rinse thoroughly. White silks may be slightly blued. Squeeze dry; do not twist or wring silk fabrics. It not only weakens the fabric, but makes creases which will be hard to remove without a hot iron. Hang carefully, or, for special care, roll in absorbent cloths to dry.

If the silk garment is colored, then additional care must be taken in washing. Reduce the temperature if necessary to prevent bleeding, and wash and dry quickly. It is not wise to use a mordant to set colors in silks, as the salt or other agent will tend to harden the water, which is, of course, a disadvantage in washing animal fibers. (See also Chapter XIII, *Colored Clothes.*) In washing dark colored silks, the best results will probably be obtained by substituting soap bark for soap (See p. 157).

If the silk needs a little redressing, use gum arabic in the last rinse water. This often prevents a thin silk from appearing washed-out and sleazy. Roll the garment in a cloth, and iron before it is entirely dry.

GUM ARABIC

2 teaspoonfuls gum arabic (powdered)
1 quart water (warm)

Mix water with gum arabic as with flour. Let stand until all is dissolved. Strain through cheesecloth and use as starch water or for slight stiffening in the last rinse water (See p. 122).

Ironing.—Since silk scorches easily, and heat yellows white silk, use an iron that is not too hot. The garment should be ironed on the wrong side, and should be protected by placing cheesecloth under the iron. If it has been carefully hung or rolled, it will not have creases that require such a hot iron. To roll a silk, sandwich fashion, in several thicknesses of heavy cloth removes the excess moisture and the garment is evenly damp, but in no way wet. Silk half dry and half wet is likely to iron with spots as is especially true of pongee. A silk too wet and ironed with a hot iron will be stiff or papery. Taffetas and messalines will need to be ironed while damp, to develop a finish, and crêpes and marquisettes must be ironed damp to prevent shrinkage.

Woven Fabrics.—RIBBONS. Wet ribbons and stretch them on a clean table, board or marble slab. Then scrub with a small, soft brush and neutral soap until clean (Fig. 59). Move the brush

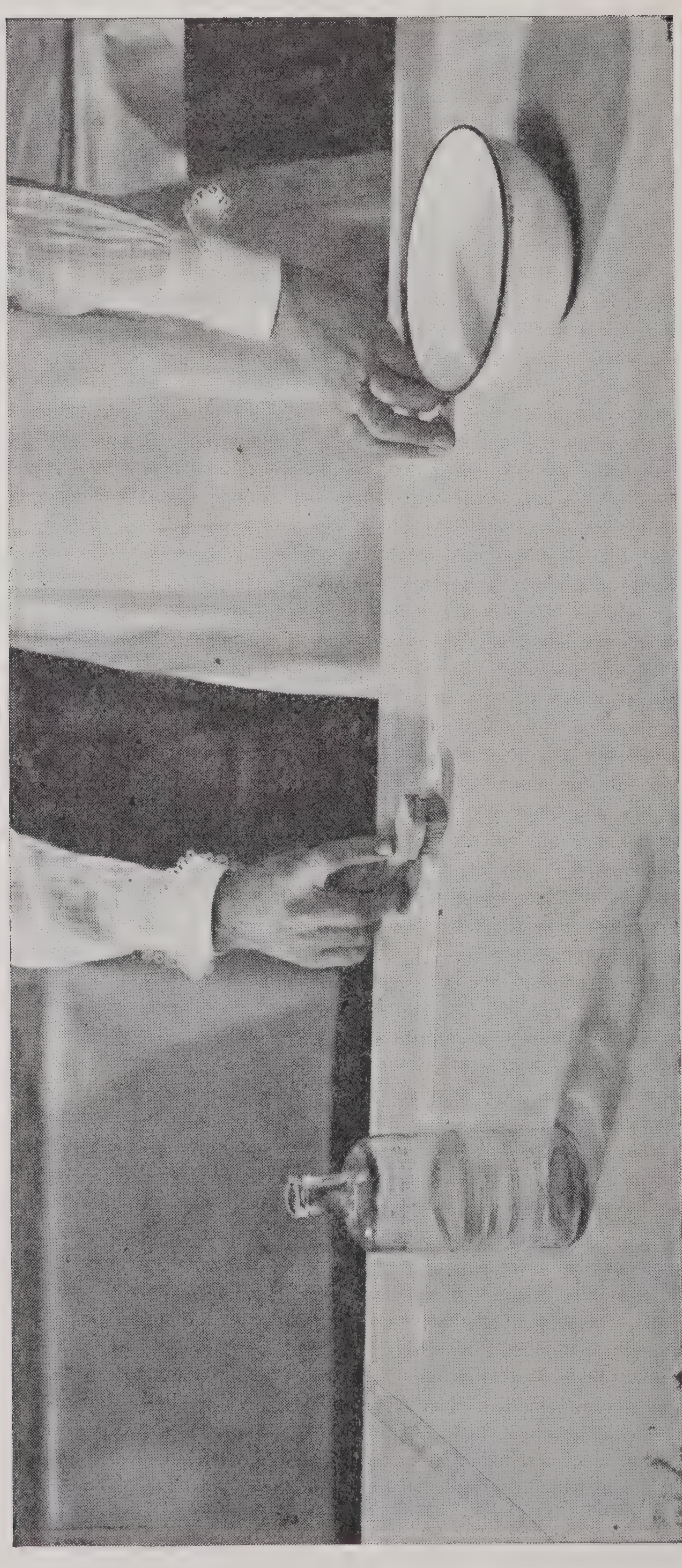


FIG. 59.—Washing and drying ribbons.

across the ribbon from selvage to selvage to prevent the fibers from spreading. Rinse in clear water, keeping ribbon smooth and straight. Remove some of the water by running the hand down the ribbon and pressing out the water. To wipe it with a cloth will help to dry it. Stretch the ribbon on the table or board again, and allow it to dry. Ironing will not be needed in this method if the ribbon is allowed to lie flat until dry. Washed ribbons may be ironed with a cool iron when nearly dry. Narrow lingerie ribbons may be dried by winding them around a bottle after washing. For quick work the tile or enamel in a bathroom will answer for a drying space. If one does not care to take the time to remove ribbons from starched garments like underwear, it is better to substitute lingerie tape, which is cotton.

CHIFFON, SILK CRÊPE, MARQUISETTE.—Silk and cotton, or silk and linen, should be treated as silk. Wash these delicate fabrics with as little rubbing as possible, and roll them to dry. Use layers of white cloth between the fabrics to prevent any color from bleeding. Iron before the garment is dry in order to prevent the usual shrinkage. Silk-embroidered linen should be washed as silk, quickly and without rubbing, dried quickly, and when half-dried laid on a thick pad wrong side up and ironed until dry. Pressing the linen on the right side will give a gloss to the linen. This can be done without touching the right side of the embroidery.

NECKTIES.—Small grease spots can be rubbed off with a soft cloth wet with chloroform. Before washing the necktie, loosen the inner lining. Lay the tie flat and treat as for ribbon. Press when almost dry. If too damp when pressed, the tie will be stiff and shiny. If the tie is kept perfectly flat during the cleansing, there will be little need for any ironing. Neckties can be cleansed with gasoline according to the usual method for gasoline work. In this case the lining need not be removed.

Pile Fabrics.—VELVET may be cleansed by sprinkling thoroughly with magnesia or corn meal, covering, and letting stand twenty-four hours. Brush off with a soft brush. A second application will produce better results. All velvets may be freshened or folds taken out by steaming. Velvets may be cleansed with gasoline, and then when dry, steamed to freshen the pile. Velvet coats may need to be loosened at the bottom from the lining in order that steam may be inserted directly under the velvet.

TO STEAM VELVETS, stand a hot iron on end and cover the bottom of it with a wet cloth. Over this pass the velvet, holding the wrong side next to the damp cloth. The steam from a tea kettle may be used for large and heavy work (See Frontispiece). This is especially easy with a spreading device put into the spout of the kettle. Have very little water in the kettle so that it will not sputter out with the steam. With this heavy work there should be some one to assist, because the velvet should be shaken dry and not allowed to crease while damp.

Velvet Collars.—Make a heavy white soap suds like a shaving lather. To a pint of such suds add one-half teaspoon of kerosene. Using a soft brush, spread the suds without much water thoroughly and evenly over the soiled velvet collar, then rub lightly with the soft brush or cloth. Wipe the suds off. There need not be enough moisture to wet the collar. After wiping with several freshly rinsed cloths, being sure all soap is removed, steam on a hot iron. (See Steaming Velvets, above.)

Duvetyn may be cleansed as velvet, or washed as velveteen.

Knitted Garments.—Knitted silk fabrics, on account of their tendency to get out of shape, require even more care in laundering than do woven fabrics. They should be soused and squeezed in suds, then thoroughly rinsed. The drying should be done as far as possible without stretching the garment beyond its original measurements.

Sweaters.—Wash as directed above. Avoid all pulling or rubbing. Shape and dry to measure as for woolen sweaters (See p. 161). If the sweaters are colored, lay clean cloths between the thicknesses of the garments to prevent bleeding of color.

Underwear.—Wash in lukewarm suds, and rinse thoroughly. As suggested in Chapter XIII, pink silk underwear should be given extra care to prevent undue loss of color. The hanging of these garments controls the length and width. Therefore, they should be hung so as to involve the least strain, and be shaped while drying. If they are pressed, they will stretch a bit.

Stockings.—We have learned by sad experience that it is not washing but over-wear that shortens the life of both silk underwear and silk stockings. The chemical action of perspiration soon rots the silk fiber, and causes it to break. So the best preservative for such garments is frequent and careful washing. Stockings should be washed every day in cool water with soap in solution. Rinse thoroughly, squeeze, and shake to open up the stocking, then hang in a warm—not hot—place to dry. White stockings may be blued.

The same rules apply to silk gloves. Fingertips, where the hardest wear comes, need special care, as they must not be rubbed to any extent.

Questions

1. A man's necktie of brocade is to be washed; should it be pressed, when and how?
2. How may one be sure to finish a pongee so that it will not be streaked with water, or stiff and papery?
3. What suggestions could be given for redressing silks?
4. To what extent do you consider silk an economical fabric for underclothing? Is it fashion or economy that really makes the decision?
5. Problem: If you were to establish a salvage plant for reclaiming wearing material, how far would it be possible to make use of silks?

CHAPTER XVI

LACES

Laces, because of their very delicate structure, should be washed with the least possible rubbing and pulling. Those that are especially frail may be basted to a piece of cheesecloth which has been shrunk. Soaking, squeezing, and shaking in the water are the safest methods to use.

Lace that is very old is likely to have small spots like iron rust and mildew. Both have probably been formed from moisture in the air causing the iron particles to rust and the mold spores to attack the fiber. Dilute acid will remove the iron rust without harm to the fabric. The mildew will be unconquerable. Many times lace yellows because it was put away without washing, and the body oil or perspiration has done its work.

Stains.—Stains on laces may be removed as from any other fabric. Thought must be given as to whether it is a silk lace, a wool lace, or a cotton one. To remove stains from wool and silk laces, see Chapters XIV and XV. The removal of stains from cotton and linen laces will be found as easy as from linen and cotton cloth (See Chapter III).

Washing.—Dissolve a white soap in warm water. Add sufficient soap solution to the wash water to make good strong suds. Soaking the laces in this water may clean them without rubbing. For very delicate laces a second soak in clean soapy water will be less harmful than rubbing. Rinse thoroughly in several waters. White laces (cotton and linen) may be blued in very pale blue water. Cream or ecru laces may be retinted by adding a clear solution of tea to the last rinse water, the quantity of tea used depending upon the degree of yellow or ecru desired. Usually the wet fabric is about twice as deep in color as the dry one will be. The tea liquor may be prepared by boiling one tablespoon of black tea in one quart of water, and using the required amount of clear tea. Since lace has great absorbing power, care should be used not to make the tint too dark.

Bleaching.—Discoloration may be removed from lace by: sunlight; rinsing in borax and water; bleaching with Javelle water if cotton or linen; bleaching with potassium permanganate and oxalic acid; bleaching with oxalic acid if wool or silk.

The lace should be washed as clean as possible before bleaching.

SUNLIGHT.—Spread the clean lace, thoroughly wet, on a cloth or towel in the sun. Time is required for this process, during which the lace should be kept wet.

RINSING IN BORAX AND WATER may whiten the lace, because borax is a mild bleach. This and the sunlight method might be combined. If borax is used and is not washed out, it will produce a slight stiffness like starch.

JAVELLE WATER.—Use one-quarter of a cup of Javelle water in one quart of hot water. Drop the lace into this Javelle bleach, then in a few minutes lift from the bowl and rinse in a second bowl of hot water. This bleaching and rinsing should be alternated without long soaking. (See p. 29.) Two or three such applications bring good results without harm to cotton and linen laces. Then wash thoroughly in soap and water. Javelle should not be used for wool or silk laces.

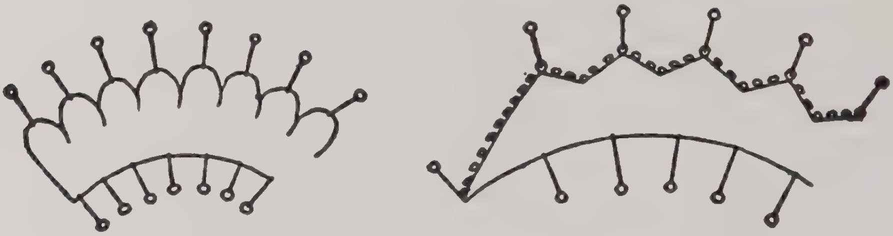
POTASSIUM PERMANGANATE.—Apply the permanganate solution (see p. 30) to the discolored cotton or linen lace, rinse with warm water, then apply dilute oxalic acid, which will take away all the brown stain produced by the permanganate. Lace which has been bleached by this method or with the Javelle should be washed thoroughly in soap and water, to remove all traces of the chemical. Should it be a collar that is soiled about the neck rim only, gather up that part in the fingers and bleach only the stained part. Then wash the whole piece to produce even color.

OXALIC ACID will be especially useful in removing ink or rust spots from wool or silk lace (See pp. 24, 27).

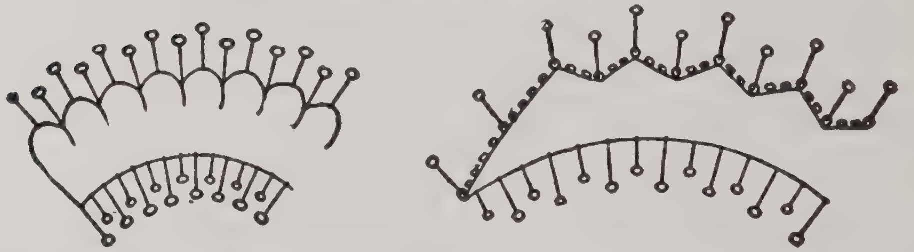
Pinning.—Pin the lace right side up. Lace is not starched, and is best unironed. It should be pulled and pinned into shape. This will open the mesh of the lace, and the drying under tension will give sufficient stiffness. If this stiffness is objectionable, the lace may be stroked with the flat side of the thumb and finger, which will soften it.

To make pinning easy, have a pad stretched as for an ironing board, have plenty of pins, and a tape measure or folded paper at hand to measure the width of each section of the lace in order that it may be even.

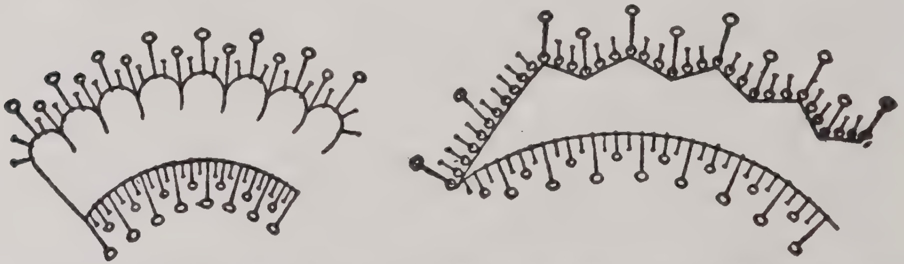
Much care must be given to the pinning of every scallop or point for each picot (Fig. 60). The first few pins should be put in with the idea of producing the straight lines in lace by the yard, or the curves, squares, or circles in collars, lace scarfs, centerpieces and tablecovers. Lace by the yard should be pinned at the selvage first, and finished a few inches at a time. One should remember that the pins are put in to resist the natural shrinkage which takes place in drying (Fig. 61). These pins should also regulate the width, stretching each point or curve to the width required and making each one exactly the shape of its neighbor. With the collar very damp, the stretching makes the pattern very open and perfect, without harm to the lace.



The first pinning is very important.



The second pinning should shape the scallops and points. Sufficient pins should be used to hold them well in shape and to eliminate all scalloping or unevenness of the plain edges.



The third and finest pinning for perfect results should be done by placing a pin in all small loops or picots. These pins should not be removed until the lace is dry. Should there be any raised flowers or leaves, like the roses in Irish lace, the petals should be lifted with a pin until each one is opened and raised.

Fig. 60.—Lace pinning.

Or, if the worker prefers, the lace may be basted closely on shrunken cheesecloth, giving special care to the shaping of points and scallops. The lace is then washed on the cheesecloth, and the cheesecloth pulled and pinned taut for the drying. This method

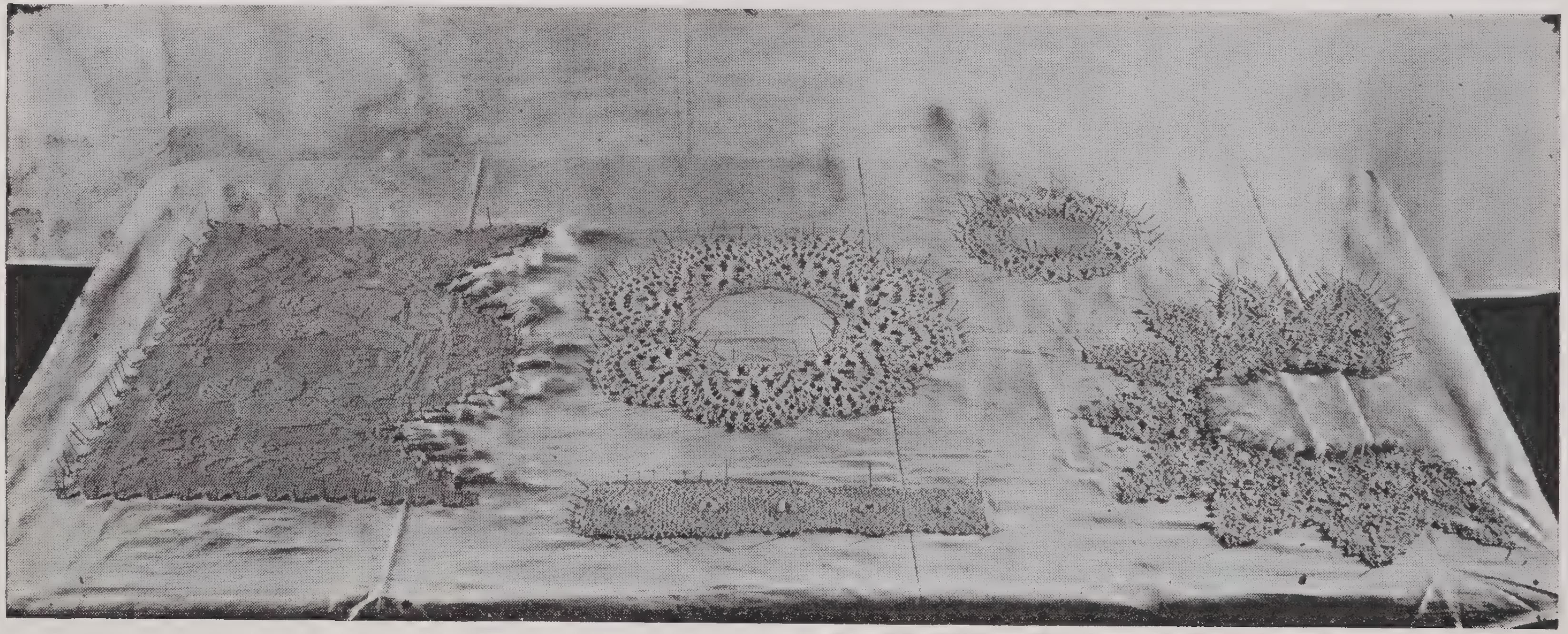


FIG. 61.—Showing lace pieces in various stages of pinning.

takes longer time, and for all lace, except that which is much worn, it is not a method that will give as good results.

To put laces away for storage, leave no dressing in them; roll in blue tissue paper to keep them from yellowing. Rare heirlooms should be put away under glass, to keep away both air and dust.

Lace Yokes and Sleeves.—Such laces may be cleaned without removing from the dress, if care is exercised to keep the water or gasoline, if used, from running down into the material of the waist. Powdered magnesia, chalk, or Fuller's earth may be spread on the yoke with less chance of harming the dress material, but only slightly soiled garments can be cleaned this way. If the lace is to be cleansed by water or gasoline, cover the waist carefully by wrapping in a heavy towel; then, with a soft brush, brush the lace with heavy suds, or with gasoline, brushing down from the waist, as this will prevent the moisture from running back into the material. It may be found advisable when using water or gasoline to lay the lace on a heavily folded towel, as this will quickly absorb the moisture and prevent spreading. The cloth under the lace will have to be changed as fast as it is discolored by the soil, or the lace will be grimy. If cleaned with magnesia or any of the powdered cleansing agents, the lace may be laid on a towel and covered with the powder. To moisten the lace with gasoline before covering with magnesia or Fuller's earth will help the powder to absorb the dirt. In this way let it stand for twenty-four hours, then at the end of this time, brush off the powder. If not too soiled before cleansing, the lace will be a good color. A good way to put away lace yokes or collars between times of wearing is to dust them with magnesia, dry starch, or chalk, and put in layers between clean cloths. When the garment is to be next used, shake and brush off the powder.

Gold and Silver Lace.—Cleanse by brushing with alcohol or gasoline. If this lace is in the dress, carry out the same precautions as given above. This metal lace, if removed from the garment, may also be cleaned by boiling in salt water, using two tablespoons of salt to each pint of water.

Drawn Work.—Care must be used in doing drawn work because, while it seems sturdier than lace, the threads of the fabric which compose the pattern are often most delicate. Wash as one would any lace without much rubbing, then blue, dry, and sprinkle; or it may be ironed before completely dry, as has been suggested for napkins and tablecloths. Tastes differ as to whether it should be starched. If it is starched, the starch should be very thin, preferably rice or wheat starch. To iron, if possible use a large ironing surface like an ironing table; iron from the center out to the edge in straight lines and with the weave. This will prevent the usual puckering and ruffling of the hems. The ironing should be done on the wrong side with a dull-pointed iron, as a sharp point is often responsible for tearing. A cover of cheesecloth will help to keep the iron from catching in the threads. Iron dry to produce a smooth finish and a slight stiffness.

Questions

1. What special care must be given to cleansing metal laces?
2. If an old piece of lace was to be put away as an exhibit, what special treatment would you give it for cleansing and what do you consider the best way to store it permanently?
3. What are the special points to consider in removing spots from old laces?
4. If a lace circle seems determined to draw up and cup in the middle, what are all the combined ways to overcome the difficulty?
5. Problem: If several pieces of lace, which are made of different weights of thread and of various shades of the same color, are to be dyed to be the same color and shade, how would you proceed?

CHAPTER XVII

SPECIAL CLEANING

This chapter has been set aside for the consideration of special work because in the usual "wash day" one has little time for special problems. Very often, too, the housewife hesitates to attempt the cleansing of these garments, feeling that success is doubtful, and pays the expert big prices to do what she really could do herself at small expense (Fig. 62). This chapter should be studied in connection with other chapters on the treatment of the various fibers. For example, if the fabric is silk or wool, or a combination of fibers, let the general directions given elsewhere serve as guides to the special directions given here.

Voile.—There are three kinds of voiles—cotton, silk, and wool. Voiles that are a combination of two of these fibers should be washed according to the rules for the more delicate fiber. Any of the voiles may be washed in lukewarm soapsuds, which has been made of neutral white soap. There should be several rinse waters of the same temperature as the wash water. Pure white voiles may have a very light blue rinse, with just enough blue to whiten them, without tinting the cloth. Colored voiles may need to have the color set like any colored fabric. Fortunately salt and water may be used for the setting of color, as it is harmless to wool and silk, as well as cotton, voile. A voile skirt, if washed without ripping, should be hung by the band like a wool skirt, pinning the band several places on the line, that there may be no chance for sagging. If the garment has been ripped up to be washed, then care should be used to hang the various lengths perfectly straight. Instead of being hung, the voile may be rolled in dry cloths, and when nearly dry, be pressed with a warm iron. Press on the wrong side, with a cloth between the voile and the iron. Cotton voiles, as a rule, are not starched. Silk and wool voiles should be rolled and then pressed. For tinting of voiles, see Chapter XVIII.

Chiffon and Chiffon Cloth.—Wash in lukewarm water with light suds. Wash as any silk (see Chapter XV), rinse, blue slightly if it is to be a pure white. If it is colored chiffon or chiffon cloth, consider it as colored silk (see Chapter XIII). Iron either material with a warm iron on the wrong side when the fabric is nearly dry.

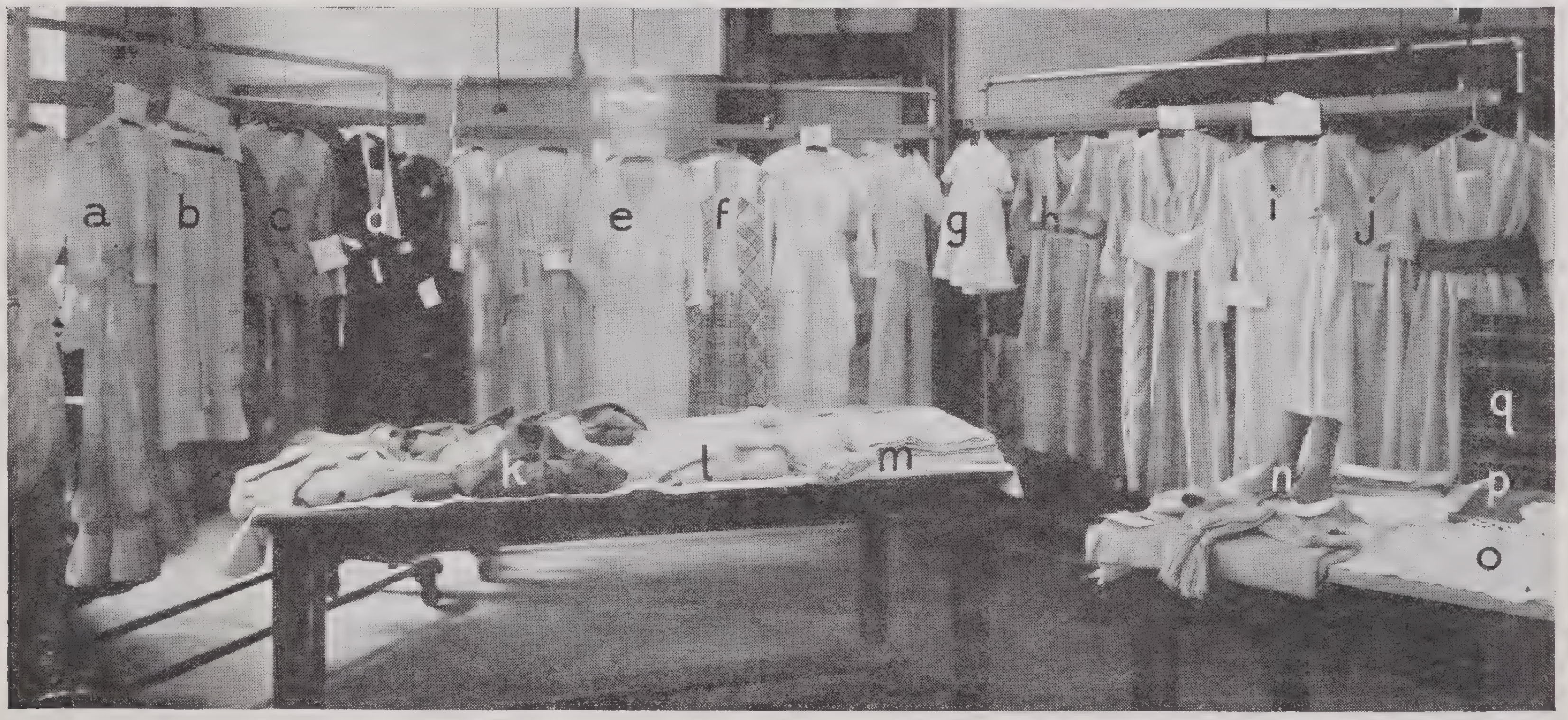


FIG. 62.—Every garment in this group has been laundered with soap and water—a lesson in economical renovation: a–voile; b–serge; c–foulard; d–crêpe de chine; e–organdie; f–gingham; g–muslin; h–georgette; i–liberty crêpe; j–challie; k–knitted woolens; l–crocheted woolens; m–blankets; n–spats; o–lace; p–silk scarfs; q–steamer rug.

Jersey Cloth.—This cloth may be treated either as wool or silk according to its fiber (see Chapters XIV, XV). The length of the garment should be measured before washing, and the measures recorded so that they may be used in stretching and shaping the garment during its drying. The washing must be done by sousing and squeezing, with little rubbing or lifting from the water. Plenty of rinsing is necessary to remove all soap. If color plays a part, reduce the temperature of the water. After the garment is dry, press it with a warm iron, using a dampened cheesecloth to protect the fabric.

Velveteen, Corduroy.—Wash by plunging the garments up and down in warm soapy water—rinsing in the same way in several clear waters. Squeeze dry. Do not put through a wringer, as it will crease it. When dry, brush with a soft brush until the nap is all raised and fluffy. If well brushed, it will look like new. To prevent seams from puckering after washing, sew such goods with a loose stitch.

Veils.—Wash in warm water and soap; if black, they should be rinsed finally in a strong solution of black tea, to which gum arabic has been added. Use about two teaspoons of powdered gum arabic to one pint of water. While the veil is still wet, spread it in shape to dry, being careful to have the edges straight. White woolen or silk veils need no gum arabic. Chiffon veils may be washed in soap and water and pressed when half dry. To freshen color, a dye rinse may be used in the same way as one uses bluing. Strong tea water may be used for rinsing mourning crêpe, but as mourning crêpe requires expert work for refinishing, the best way to remove dust and to brighten color will be to brush well and use gasoline as a cleaner rather than water.

Chamois, Doeskin and Washable Gloves.—The cleansing of these gloves may be easily done on the hands by brushing in lukewarm suds with a soft brush. Putting them on the hands makes it possible to see all streaks and to give special attention to the ends of the fingers. Rinse in clear water, then pull fingers into shape and blow the glove up to prevent its drying too small. Do not dry in intense heat. Rub the glove when half dry, to overcome its stiffening. Gloves that have grown hard and stiff, and perhaps too small for the hands, from poor washing, should be wet, put on the hands, and rinsed in warm water to which a half-teaspoon of olive oil has been added. This oil will soften the kid. Heavy colored stitching on the back of the glove had better be wiped to avoid the possibility of the color running. Colored washable gloves will be kept from streaking by stuffing the glove with crushed tissue paper to prevent two thicknesses of material touching. This use of crushed paper is especially good to prevent the heavy colored stitching from running into the back of the fabric, because it acts as a pad, absorbing surplus moisture.

Elastic Goods.—Elastic goods should be washed in lukewarm water and soap, as intense heat causes the rubber to deteriorate. A soft brush will be of great help, as it will sink down into the fiber of the goods, thus cleansing more rapidly. Rinse thoroughly and hang to dry, as would be done with any white goods. Rubber should be dried slowly, at room temperature, so that it will not become soft and gum-like.

Dress Shields.—The life of dress shields is increased by cleanliness. They may be easily washed with cool or tepid water and a white soap. If they are much discolored, a soft brush may help to clean them. Do not iron. Dress shields should be washed so frequently that it is preferable not to sew them into a garment, but to fasten with small safety pins, or with snap fasteners.

Corsets.—A corset that has been worn too long is hard to whiten and clean. Prepare a good, strong lather, add a little ammonia and borax, and with a small scrubbing brush scrub the corset thoroughly. Rinse in several waters, and hang in the sun to bleach, if it is white. The laces of the corset will be more like new if taken out of the corset to be washed. The corset may be starched and ironed; either iron the laces or wrap ribbon-fashion round a bottle to dry.

Overalls.—Overalls usually present a grease problem. It is advisable, therefore, to apply to the grease spots kerosene or some soft, clean fat. Then with warm, soapy water and a good scrubbing brush it is possible to get them quite clean. It would be wise to add some grease-cutting agent to the soap solution, such as borax, ammonia, or dissolved laundry soda. If, after the overalls are washed and rinsed, they are hung quite wet on the line, they will be found to dry so smooth that ironing is unnecessary. To wash overalls in a home washing machine, dissolve one cup of laundry soda in hot water, and add to the cold water for soaking.

If overalls are to be washed in a machine, follow a formula somewhat similar to the one on p. 82.

To Remove Rain Spots.—Steam the garment by holding over the spout of the tea kettle. Shake the garment in the steam until moist and continue shaking until dry. Fine silks and even delicate colors respond well to this method. In extreme cases the material may have to be pressed; use a damp cheesecloth rather than heavy muslin. This pressing may reduce the glaze, but that is what has happened in the spotting by rain; therefore the glaze must be taken from all.

Gloss Removed From Clothing.—Serges and broadcloths are likely to wear shiny. This gloss may be removed temporarily, the length of time it stays away depending in a great degree upon the amount of wear given the fabric. To remove, dampen a cheesecloth in water to which a few drops of ammonia have been added (about one-half teaspoonful of ammonia to a quart of water), and with this sponge the garment by rubbing in even, straight lines, being careful that every part is sponged. Then with a dampened cloth spread over the fabric, press until dry. Use the same precaution in the pressing of these woolens as with any other wool; that is, do not have the iron too hot, and do not iron without a cloth.

Rain Coats.—Clean with a brush and suds of white soap and warm water. Brush the whole coat evenly and thoroughly. Hang it on a hanger and rinse by pouring water on the coat, and let hang to dry. Let drip dry. Any grease spots may be washed off by special treatment for grease, and should be done before the whole coat is wet (See Stains, p. 36). A few drops of ammonia in the wash water will help to cleanse specially soiled spots.

Fancy Feathers.—Feathers are often washed and curled in the home. Make good suds of white soap and cool water and draw the feather through the hands in this water. Let the stroke be regular, pulling the feather from stem to tip. Any colored feathers may be washed in cool water. A few drops of ammonia will help to clean white or light colored feathers. Washing is better than dry cleaning, which may be done, however, by preparing a mixture of raw starch and gasoline. The gasoline removes the grease and soil, and the starch dries and fluffs the feather. Much airing will be necessary to remove all odor of gasoline, because the amount of artificial heat needed to evaporate the gasoline would dry and weaken the feather. Any washing of feathers should be done in large pans to prevent bending or chance breaking of the feather. Dress the feather by drawing it through a raw starch mixture. Use about three tablespoonfuls of starch to a quart of water. Six or eight starch washings will so fill the feather with raw starch that the hairs of the feather are freed and fluffed. When entirely dried, brush the feather with a soft brush, after which it is ready for curling. Moisten with steam before curling—in fact, steaming a feather and then shaking it over the top of a stove is often enough to give curl to it. For a tighter curl, draw three or four flumes at a time over a dull knife, like a bone paper cutter, after first steaming the feather. If the feather is too dry, the knife will break it.

Pillows.—Pillows may be washed, without removing from the case, in a tub or washing machine, if it is large enough. Wash by sousing up and down in the water of lukewarm temperature, and then after rinsing, hang to dry in the sun and wind. Choose a windy day for this work if possible, as wind dries and livens the feathers well. It will be easier to clean the tick if the feathers are removed, as the tick often needs rubbing which will break the feathers. To wash ticks and feathers separately, transfer the feathers to a cheesecloth bag, and wash them in this bag. Put the tick, without shaking, into the water; this prevents flying of down. Dissolved laundry soda in a cold soak will do much to remove the grease stain in the ticks. Wash and rinse, then hang the tick to dry. If it is well hung, it need not be ironed. The feathers can be easily returned to the clean tick by sewing the two openings together and tossing the feathers from one bag to the other.

After one has once done this renovating, she will realize that it is less expensive and less troublesome to change the pillow slips twice a week, thus making sure that the pillow does not absorb the oil from the hair.

Down Quilts.—Prepare suds of warm water and white soap. Souse or knead the quilt in the suds. Use a second suds, two rinses, and squeeze the quilt as dry as possible. Hang it to dry by spreading it between two lines. As often as possible, while it is drying, shake it from all sides to liven the down and to help respread it. After the down is dry, little time will be required to spread it about with the fingers. Press the silk or sateen cover with a warm iron between the wads of down. These quilts may be most satisfactorily cleansed, and will lack only a little of the original puffiness which was secured by blowing the down into the various sections of the pattern as the quilt was being made.

Cotton and *wool quilts* need care in handling to prevent the filling from being wrung and twisted out of place. Better results will be obtained if they are closely tacked or quilted.

Curtains.—Fabrics such as voile, cheesecloth, marquisette, and dimity are cleansed and usually ironed in the same way as white cotton dress material (see Chapter V). The bluing should not be too deep in color, as these fabrics are thin. The starch should be in a thin solution—about two teaspoonfuls of starch to one quart of water. In using a thin starch like this, better results will be obtained if the curtains are not dried before being ironed. Iron in straight lines, keeping the selvage perfectly straight and even. If the curtain is ironed crosswise instead of lengthwise, it is apt to be too short when finished.

Lace curtains require care in handling, as they are more frail than other curtain materials. Since sunlight and dirt tend to rot the fiber, lace curtains will last longer if cleansed frequently. Measure them and record the measurements for use in stretching them. Shake them to free them from loose dirt, then wash in the same way as any lace (see Chapter XVI). They may be tinted by adding tea solution to the starch (see p. 122). Net and lace curtains cannot be satisfactorily ironed, so if possible shape them to dry by pinning (see p. 173). They can be stretched and pinned on a sheet on the floor, but a curtain stretcher is much more satisfactory, provided the pins are adjustable. Permanent pins may pull the scallops out of place; in this case perhaps the better way would be to baste the lace before washing to strips of muslin, which can then be fastened to the pins. The commercial laundry man has a curtain stretcher whose pinning strip is about two inches wide and made of fine wire teeth like a carding comb. These numerous teeth hold every part of the lace edge, preventing pulling or tearing.

Silk curtains are washed and ironed in the same way as other silk fabrics (see Chapter XV).

Cretonne Draperies.—Cretonnes are easily washed, by following the rules for colored clothes (Chapter XIII). First shake them to free them from all dust, and remove all drapery pins to prevent the formation of rust spots. Prepare the wash water, making good suds with white soap and warm water. Souse the fabrics up and down, or use a washing device to force the suds through the fabric. Do not rub the material, as this often causes the colors to blur (see Fig. 55). If necessary, use two suds. Cretonnes that are not clean will have a grimy look that suggests fade.

Bran water (recipe p. 157) is excellent for cretonnes, used in the place of soap. Starch water—one-half cup of dry laundry starch to eight quarts of water—is also a good soap substitute. In using either of these soap substitutes, add a little of the cleanser to the rinse water, so that enough may be left in the fabric to stiffen it when it is ironed. Do not use too hot an iron for ironing.

Other Draperies.—These need no special discussion here. They are washed according to the kind of fiber and the color quality. In all cases, it pays to wash them frequently enough to avoid the necessity for hard rubbing or harsh cleansing agents.

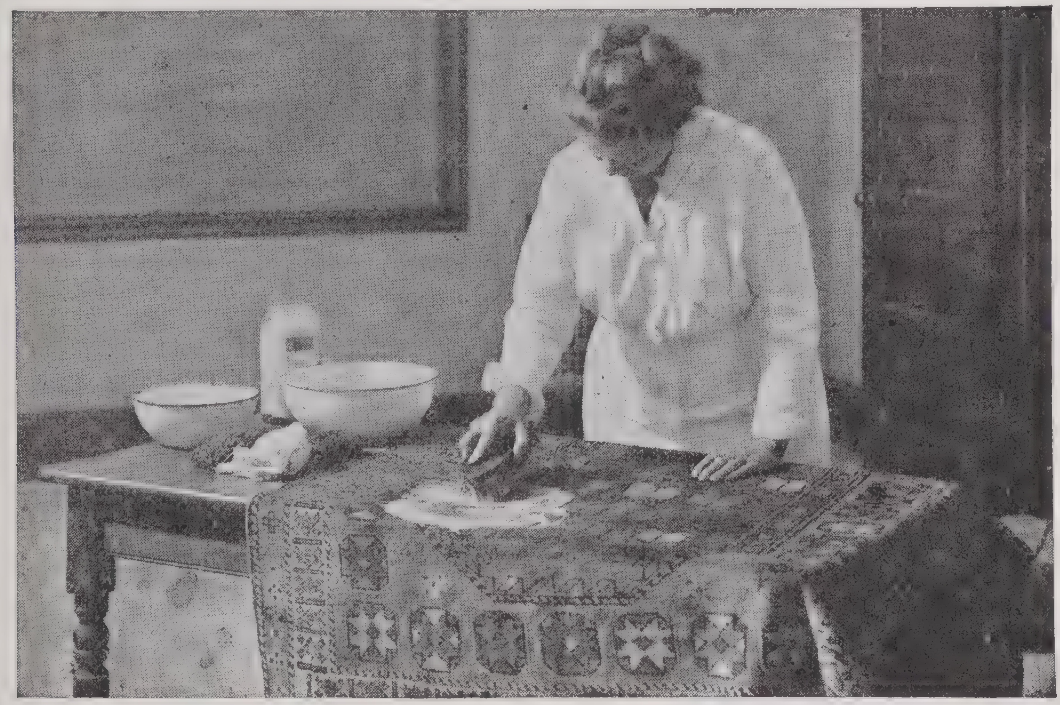


Fig. 63.—Washing rug or carpet. Any rug may be washed, if the colors are fast. Test with a little water first.

Tapestries.—These are either wool or silk fabrics, therefore they require careful cleansing. Also, they are often old and tender as to fiber, so great care must be taken not to break the threads. First get out all possible dust with a vacuum cleaner. Tack the piece on a table top or hang it flat for washing. Make a strong heavy suds with white soap and lukewarm or cold water. Apply the suds with a soft brush, then rinse with clear water until all soap is removed. This work is done in much the same way that a rug is cleaned (Fig. 63).

Rugs and Carpets.—The daily care of rugs and carpets of course does much to keep them clean. However, they need freshening at intervals, and this may be done at home if the housewife has the time to give to it.

Rugs.—Any rug may be washed, provided it is a good one—that is, with a close foundation weave—in which the colors are not likely to be harmed by water. The main thing to remember in cleansing wool or worsted rugs is not to water-soak them. First remove all loose dirt with a broom or a vacuum cleaner. Spread the rug on a flat surface, such as a table top. Make a heavy lather—as heavy as a shaving lather—of white soap and lukewarm water. With a soft brush spread this lather over a small portion of the rug (see Fig. 63). Work with an even, circular motion, forcing the lather into the pile, but not through the foundation weave. Rinse thoroughly with a cloth or a sponge wrung out of warm water. Change the rinse water as often as it darkens in color. The rug may dry flat, or it may be hung on the line right side up to dry. Brush the nap when dry.

Carpets are treated in the same way as rugs. As they are large and heavy to handle, it may be necessary to rip them apart for washing.

Rag Rugs may be put into the washtub and washed. First use a clear wash to remove any dirt that could not be brushed out. Then wash in soapsuds. A scrub brush will help to dislodge the dirt. Rinse thoroughly in several waters, as the rug will be sticky and the colors dull if any soap remains in the rug. Do not wring the rugs, but hang them dripping wet on the line. If one does not have the strength to wash rugs in the tub, and does not have a washing machine, it is better to lay them flat on the floor of the porch, where they may be scrubbed, and rinsed with pails of water or with a hose.

Fur Rugs are like any other skin material, and need care in cleansing. A white fur rug, if not mounted on a flannel or wool back, may be washed in warm suds, and rinsed in lukewarm water. A little bluing in the last rinse will whiten the hair. After such a washing the skin of the fur needs dressing with neatsfoot oil. If the rug is mounted, it will have to be cleansed in the same way given above for rugs (Fig. 63), or be dry-cleaned with cornmeal. In this latter case, great care must be taken to remove every bit of cornmeal from the rug; otherwise, it may become a breeding place for vermin. If possible, choose a windy day for this work.

Questions

1. If delicate colored fabrics are to be cleansed, to what extent is it possible to expect perfect results?
2. When a fabric is inclined to draw up owing to its weave, what various ways and means may be used to assure its being finished almost like new?
3. Given a silk fringe to wash, what ways can you think of to do it without knotting and pulling it and still have it clean?
4. Problem: From your study of laundering, what special points do you think might be used for a campaign of thrift or of cleanliness? What posters might be arranged and what printed folders of directions worked up?

CHAPTER XVIII

DYEING AND DRY CLEANING

THESE methods of renovation are considered by many housewives to be outside their field, with the result that such work usually goes out of the house, and represents a considerable annual expenditure of money. The housewife who must economize can profitably study the problem, to see in what way she can modify her methods of cleansing through more careful choice of materials and patterns, or substitute one type of renovation for another, to the point of making her methods of renewal more truly economical.

Dyeing.—Dyeing is an important economic process of the renewal of clothing, which follows closely in value the laundering, sponging, and pressing of garments. It can be done with ease, and with much accuracy after a little study, without the danger that accompanies dry cleaning. In fact, the housewife should be urged to do more of the dyeing of garments in the home, and let all dry cleaning go to the professional worker. Dry cleaning introduces so much danger that it is almost unsafe to present the subject to the amateur. In many cases where economy must be practiced, dyeing rather than dry cleaning should be chosen. Dyeing freshens a garment because it follows washing, brightening the color because it is clean and because it has been rinsed in its own color of dye. This is what is done when the dye soaps are used, for they serve both to clean and to brighten color. A dye covers fade and streaks, hides wear and may renew a garment by producing an entirely different color.

The conditions for good work really can be summed up in a few practical suggestions, which must be considered before any work is started. First, the garment must be washed clean to make it suitable to wear, and to remove soil, which would cloud the color. If grease spots are present, they will resist the dye. If the spot is very dark, like ink, and one that cannot be washed out, that particular spot will be darker than the rest of the fabric. In this case the dye chosen must be of a shade dark enough to cover entirely the spot. There are really only two cover colors—midnight blue and black. In dyeing a two-colored fabric, one must expect the two colors to be still two after the dye bath, unless a very dark blue or a black is chosen to cover. For example, a blue and white striped foulard silk, if dyed in a blue dye, will result in a dark blue background with a light blue stripe.

How to Choose a Dye.—The dye used depends on the fabric to be dyed. If the material is wool, silk, or cotton, be sure that the dye is prepared for wool, for silk, or for cotton. The difference in the colors produced by one dye on two fabrics is well illustrated in dyeing a wool or wool and silk fabric that has been stitched with cotton thread. The cotton will always be many shades lighter and of a very different luster.

The color of the dye already in the fabric will control the shade and tone of the resulting color; for example, a light blue on top of white will result in a paler blue than will a light blue on a light blue. The choice of the new color of the fabric should be controlled by the old color, and by the way in which shades of color are produced through various combinations. If the material has a pattern, the dye must be dark enough to cover the darkest portion of the pattern. Degrees or shades of color result from various proportions of one, two, or even three colors being combined. Equal amounts of red, blue, and yellow make black, so that to add yellow to a purple (which is a mixture of red and blue) will gray or soften the color. Red and blue produce purple; red and yellow produce orange; blue and yellow produce green; varying proportions produce variations in shade. Often the shades are made clearer and softer by dipping the fabric into one dye of a single color, and then passing it into a second dye of another—perhaps opposite—color. This color combining is called "topping."

To mix colors by weight of the dry dye is the only possible way to get identical shades in two separate mixtures of the same color, and even this is doubtful. This is the reason that it is advised by the salespeople at the store counters to buy all of a special knitting wool or embroidery floss that can possibly be needed and to return the unused portion; it may not be possible to match it a second time.

Preparation.—After the color has been decided—and it should be considered first—then the next step is the preparation, which is most important. Rip out hems and any folds or bindings which produce uneven thicknesses. This unevenness often results in streaks, which could have been avoided at the beginning, but which now may have to be re-dyed in a darker shade of dye to produce an even color. Brush to remove lint or dust; then wash clean and rinse thoroughly to remove all soap.

METHOD OF DYEING.—The dye tub should always be large enough and sufficiently filled to allow the fabric to float freely in the dye. This is the first thing to do to prevent streaking. A second precaution to prevent streaking and crocking is to wash the dyed fabric in clear water until the last wash is free from color. A fabric well rinsed of excess dye will not bleed in the wash water, nor will it crock on lighter colors. Keep the dye in order that, if the rinsing produces a lighter shade than was anticipated, the fabric can be re-dipped. This is always the best way for all dyeing. Two dippings in a pale color will produce a better shade than will one long immersion in a very dark color. The final color when dry will be about three shades lighter than when wet. To test the color and the shade, use a small piece of the material and let it dry before dipping the whole garment. This will determine whether or not the color and shade are what was desired.

Follow the directions on the package, which will surely direct that the fabric be weighed as dry fabric; and from that the amount of dye needed can be estimated; that the dye powder be thoroughly dissolved; and that the dye mixture be ample enough to allow the garment to float loosely and to be free to move easily in the kettle, and at the same time to be concentrated enough to give the desired color. Have the clean fabric thoroughly wet; use two sticks (old broom sticks about two feet long will serve) to stir the fabric. Constant stirring and loosening of the material will let the dye reach all parts and produce an even color. The dye pot is best of agate or enamel, but there should be no uncovered iron spots that may produce a rust spot on the material.

Salt and vinegar clear the color tones and act as mordants. Either should be used according to the directions on the dye package.

Since color is such a vital factor in the renewing of fabrics, tints and soap dyes play an important part in renovation.

TINTS can be produced by strong *tea water,* made from boiling black tea leaves. *Coffee* solution gives a tint, but is less clear than tea; moreover, it has an odor. *Colored papers* may be used by allowing them to soak in water and bleed until the degree of color is sufficient to dye a bit of lace or a thin fabric. Such a tint will be very uncertain in its degree of color and in its lasting power, both in wear before washing and in withstanding a real washing of the garment. *Dye powders* may be mixed with the rinse water in the same way as a ball of blue is used to color the bluing water.

Dye soaps are supposed to clean like any other soap, and to dye when they clean. They may be uncertain in their color tones, because of the grease, the soil or uneven rubbing, and great care must be used to keep the color even. Here, again, keep in mind that grease in the cloth will cause it to resist dye, and perspiration, because of its chemical action, may produce an absolutely different shade. This is not necessarily the fault of the dye soap any more than it would be of any dye, but like all dye, the color must be dark enough to spread over or to cover the irregularities.

Dye soaps can be soaked and the color allowed to bleed into the water, which is then used as a color rinse. The use of two different colored soaps produces the same soft color tone as when one uses two dyes, either mixed or "topped." In using pink or cherry, a color much used by those using soap tints, a prettier, softer shade will be produced by mixing a little brown with the pink. This will tone the strong pink to a more delicate flesh color, or will make an apricot color.

Boiling soap dyes in the same way as regular dyes are boiled produces a more lasting color; the fabric, when boiled in the dye, absorbs it more readily and more completely, and holds it more firmly.

Finishing.—Wring out all excess dye, then shake the fabric so as to have it dry quickly. This method must be followed absolutely in cases where a garment, rather than a single thickness of material, is dyed. Rolling the wet fabric in heavy cloths will keep the dye from streaking.

To iron the material, follow all the usual methods of pressing, following the rules for each type of fiber—cotton and linen, or silks and wools—being careful not to have the iron so hot as to change the color, or to produce a glaze on the heavy seams or where two thicknesses come together, as in plaits or pockets. Press as much as possible on the wrong side of the material, using a cloth to protect it.

Dry Cleaning.—The term dry cleaning is used when the cleaning is done entirely without water, but usually with gasoline or benzine, which are grease solvents and clean by setting free the dirt in the fabric. The object of dry cleaning is to clean by a process which is rapid, which produces no shrinkage, no change of color, no risk from colors "running," and with little need of disarrangement or ripping off of trimming or ornaments on the garment. Dry cleaning does this, and at the same time produces no extra wrinkles. Gasoline will not remove any spots or stains that are dependent upon chemicals for their solubility. Besides being a cleansing agent, gasoline is a disinfectant and an exterminator of insects and their eggs. It is especially effective for moths and bedbugs.

Two points are absolutely essential in good dry cleaning: there should be total immersion as with water, and the liquid used must be purely solvent and quickly volatile. Gasoline should be used in the place of water and in the same way. Have plenty for the "washing," and, besides, enough for at least two good rinses. Dirty gasoline from the last rinse is like dirty rinse water—a proof that the garment is not clean.

GREAT DANGER is involved in the dry-cleaning process, and even if one appreciates the danger, it is most unsafe to attempt to work in the home. *There must be no heat present,* either from a heated room or from a flame of any kind, as benzine, gasoline, and benzol are highly inflammable in the liquid state. They have such a low boiling point that they give off large quantities of vapor at ordinary temperatures, and this vapor mixes with the air, forming a dangerous and powerful explosive. Two conditions must exist before combustion or explosion can take place. One is that the liquid or vapor comes in contact with oxygen, and the other is that there must be sufficiently high temperature. *Rubbing* will often produce heat enough, through the friction, to cause gasoline to burst into flames. For this reason it is most dangerous to clean gloves when they are on the hands. Too often the worker has been severely burned because the gasoline has taken fire before the gloves could be removed. To repeat, dry cleaning must be done under fire-proof conditions. In many cases laundering may be substituted for dry cleaning, with just as good results, and at much less cost.

TO USE.—In order that the gasoline be clean, strain it through filter paper, flannel, or chamois. Filtering it through chamois is a safeguard against moisture, which, if present, of course lowers the volatility of the gasoline and may produce water spots. Water in gasoline is sure to cause slow drying and the chance bleeding of color, giving grimy color results.

Let all work with gasoline be done with every precaution for safety. This means more than using no flame or fire. The work should be done out-of-doors in the shade, on a cool day, never in the house. Use a large container, and work rapidly. When finished, do not pour the left-over gasoline down the drain pipe, because gases may be produced, causing an explosion in the pipes. A good place to empty small amounts of gasoline is on a sandy walk, where it will be instantly absorbed. Do not pour it on the grass, for the grass will be burned by it.

To Clean with Gasoline.—Brush the garment to remove all dust. Special spots ought to be outlined with a thread of some noticeable color, and these spots given special care by being brushed while the garment is in the bath. A soft brush and good white soap may aid in cleaning the very soiled places. Any white soap or special benzine soap may be used. Rub every part of the garment with even strokes so that the cleaning will be uniform. Large pieces are most easily done by being spread on boards. Rub every part of the garment with even strokes so that the cleaning will be even. Change the gasoline often enough to prevent the use of soiled liquid; and change it as many times as may be necessary to have the last rinse clear.

Pearl buttons should be taken off before the garment is cleaned, as gasoline destroys the polish of pearl. Some of this polish may be restored by rubbing the buttons with sweet oil.

When the cleaning is finished, hang the garment in the air and shade. After thorough drying and several hours of airing, the whole garment should be pressed. This pressing improves the looks of the material, which was probably wrinkled before it was cleaned; and, moreover, the heat of the iron will help to remove the odor of gasoline. When pressing, use a cloth over any material that may scorch or gloss easily.

To Store Gasoline.—Any left-over gasoline can be filtered and rebottled, and stored out-of-doors. To do this once or twice will not seriously reduce the cleansing power of the gasoline, but it must be remembered that each time the gasoline is exposed to the air, as in cleaning, its volatility will be lessened, and it will become more of an oil and less of a cleaner. Store gasoline out of the house. In many localities the fire-insurance allowance is for only one pint. This automatically stops home work, for a pint of gasoline is not enough to do even a pair of gloves. If the gasoline is not to be used again, pour it on some absorbing earth, or allow it to evaporate from the pail or tub, set out-doors in the shade. Do not pour it down the drain pipe.

Note to Teachers.—To teach dry cleaning in a classroom necessitates special investigation as to fire laws, as to the effect of such work on the insurance of the school, besides the influence upon the pupils themselves, as regards both the danger and the expense involved as compared with laundering.

This lesson is one that requires much consideration on the part of the teacher, both as to the age and the discretion of the students, and as to the safety and practicability of their doing the work in their own homes. In teaching in poorer localities, one must consider the limited spaces of tenements and of boarding houses, and the congested area where there is no room out-of-doors for the class work. Moreover, few of the students living under these conditions would have money to spare for gasoline, even if it were safe for them to use. They will probably appreciate knowledge of how to extend regular laundering methods to cover all sorts of cleaning work. Therefore, teach more of special cleaning methods. The knowledge of such fine work might easily become a source of income in poor homes, and not be attended by the danger that accompanies dry-cleaning work.

To Remove Spots.—If only a few spots are to be removed from the otherwise clean garment, it is wise to use all the precautions against streaks, rings, and fading. The streaks or spots resulting from "spotting" by gasoline are really clean spots surrounded by a ring of dirt formed by the rapid spreading of the gasoline.

Remember that gasoline is so light that it spreads rapidly, and has great penetrability as well as great dirt solvency. To prevent the dirt from being spread by the gasoline, place a soft cloth, folded to increase its power of absorption, under the stain. Moisten a rubbing cloth, which is best chosen of the same color and fabric as the garment being cleaned, with clean gasoline, benzine, or alcohol; fold a layer of the rubbing cloth over the wet spot, to prevent the garment from becoming too wet while being cleaned. It will be found that the "gasoline ring" is less likely to form if these precautions are taken, because the dirt has been taken up as fast as it was dissolved, and has not been free to spread in the fabric. Sometimes the spot that is left after cleaning is a faded spot. This fading may be lessened to a great extent by the use of pads and sponges made of material like that of the garment. Many times alcohol will clean a spot better than will gasoline, with less likelihood of a ring. It is a good plan to immerse the whole garment in gasoline after removing the spots, for in this way the rings are avoided.

Carbon tetrachloride, under various trade names, is used in place of gasoline. It is not inflammable, and for that reason is much safer for the quick "spotting" one may do in limited quarters. All rules for removing spots must be considered, for carbon tetrachloride will produce the same ring as gasoline under the same conditions. (See also p. 127.)

Questions

1. Make a color study by combining primary colors in different proportions and ascertain the degree to which color varies in its tint.
2. What effect does previous dry cleaning have upon the dyeing of a fabric?
3. Given a garment that has had spots removed before being dyed, what effect may be anticipated?
4. To what extent is dry cleaning practical and economical?
5. Problem: Given a green wool sweater, whose color streaks and bleeds, how might the sweater be made substantial in color and of service? What processes must be followed?

CHAPTER XIX

DISINFECTION OF CLOTHING AND FUMIGATION

DISINFECTANTS and fumigants are often used interchangeably, whereas each has its special duty. Disinfectants and germicides are alike in that they destroy disease germs, while antiseptics only hinder their growth. Fumigants give off a gas, which, if strong enough, is destructive to bacteria or to vermin. Any fumigant is dangerous if used carelessly because the gas or fumes are irritating and permeate so quickly, and all such agents require such special care that they should be used only by those whose training has proven to them the need of great care.

Home Methods of Disinfection.—Nature provides many powerful and safe disinfectants such as sunlight, dryness, cleanliness, and heat. *Dry air* and *sunlight* are such foes to germs that it has been an accepted method of disinfecting to spread much of the clothing from the sick room for several hours in the sun. This can easily be done by the family before the clothes go to the laundry, whether the cleansing is done in the home laundry or in a commercial laundry. It is one good way to safeguard the laundress and the laundries, to whom such forethought means health.

Heat is another good disinfectant within the facilities of home work. Boiling the clothes as is done in the laundry subjects them to heat (212° F.), which process, if continued for ten minutes in a closed vessel, will kill the germs. The addition of soap, and perhaps the soda which is used in the usual wash formula, increases the possibility of sterilization because germ life does not thrive in an alkaline medium. The usual process of washing in soap and hot water is a disinfecting process; the sun and air also play their part during the drying stage. Finally, the ironing completes the disinfecting treatment because the heat of the iron—as high as 300° F.—will disinfect. We do not assume that ironing equals the disinfecting power of oven baking, but it does do its part in purifying the garments even though the housewife's main thought is to smooth and glaze the garment.

Household cleaning agents such as soap, borax, ammonia, and washing soda are our best disinfectants. If the above facts are true, have we not every argument in favor of cleaning our clothes frequently? The fabrics of our garments are absorbent and take from the body the oil and perspiration which are eliminated as waste. Added to this soil is the discoloration of dirt. Clothes that are over-soiled are sticky, cold, and damp; besides, they have an odor. The ordinary soiled clothes are easily cleaned by the regular laundry methods, but if the body excretions cause color or odor due to sickness, special treatment is necessary. Usually these clothes should be soaked in cold water with a little ammonia for blood spots or soap for mucus, and some deodorizing solution; the soapsuds of the wash water will be an excellent disinfectant. In cases of special diseases where the danger of contagion forces extreme care, a more powerful disinfectant is the only safeguard. (See p. 198.)

Laundering of linen is an economy because the utilities of the garment impaired by use are in this way renewed. But, more important than this, laundering also improves sanitary conditions and affords one of the possibilities for the homemaker to promote the health of the family. Clean clothes are as essential to the members of the family as clean food. They are an absolute necessity for the good of all. Therefore, because laundry work plays such an important part in the health and happiness of the family, it should receive such consideration as to make the returns of the greatest help at the least cost.

Care of Infected Linen.—In the home simple methods that promote sanitation must be resorted to. In connection with the storage of soiled linen, have containers so plain, so smooth or free from ornamentation and of such substantial material that very frequent cleaning or sterilizing of the bag or basket may be possible. This is especially true for residents in boarding houses and in dormitories, where one is living in small space. The hamper or basket needs washing to keep it sweet and clean. To line such a basket with heavy muslin, shaped to fit the basket and tied in with tapes, is a real sanitary precaution which reduces work. Bags for the soiled handkerchiefs have more than gift value, if made so that they may be washed as often as the handkerchiefs themselves. Paper bags like those from the grocery are especially fine for the storage of handkerchiefs containing phlegm and mucus as from cases of colds. This paper bag containing the handkerchiefs can be lowered into cold water to which salt has been added (¼ c. salt to 2 qts. of water); the paper will soften and break, and without handling, the handkerchiefs are put to soak.

All articles, whether bed or body linen, that have come in direct contact with a person suffering from a contagious disease or that have been in the sick room, will need special care. The germs of most contagious diseases have no spores (spores are like seeds or eggs), so the extreme treatment required to kill germ spores is not needed. A simple way of caring for washable soiled linen from the sick room is to put the clothes immediately into a boiler which is half full of cold water, add soap, heat to the boiling point, and boil thirty minutes. After the clothes have been boiled, they should hang to dry in the open, as sunshine and air are both good disinfectants. This treatment will kill disease carriers with the exception of their spores, which cannot be readily destroyed until they have matured. In the case of spore-forming diseases, it may be necessary, for the sake of perfect safety, to give the clothes a second thorough cleansing after twenty-four hours, in order to destroy the matured spores. The one sure way to kill spores is to keep the garments in superheated steam for one-half hour. It is unfortunate if draperies that happen to be in a sick room are not of a washable nature, because they will need to be subjected to some treatment that makes them sterile.

PROTECTION FOR WORKER.—It is very essential that the worker who handles these germ-laden garments should protect herself She should cover all cuts or abrasions on the skin. The easiest as well as the best safeguards for the worker are a large all-over apron and gloves. If these are worn while the clothes are being sorted, then the hands thoroughly scrubbed afterward, a large part of the danger of infection will be removed. Many laundries in hospitals furnish these articles and require that they be worn, and often add to them a cap and a nose and mouth mask.

With the development of bacteriology, and as a result of constant experiments, the list of disinfectants in use is likely to change, so that what is to-day accepted as the most valuable means for destroying microörganisms may in the future be replaced by a better method.

Special Disinfection.—Special disinfection is usually brought about by immersing the garment directly in a liquid. This is the special treatment for those garments that cannot be washed and boiled and which cannot safely be handled by the worker. Bichloride of mercury, formalin, carbolic acid, lysol, and creolin are the usual disinfectants. They must all be used with great care, the first two being especially hard on the hands, if used much, and the last one producing discoloration in the clothes.

Bichloride of Mercury, or corrosive sublimate, a powerful disinfectant, is a poison. It should be handled as such, and every precaution should be used in storing it, care being taken to have it marked to attract attention, and to have it out of reach of those who are ignorant of the danger it carries. It will not stain fabrics unless used continuously, but will corrode metals. Use one tablet (7½ gr.) to one pint of water. Leave the garment immersed for one-half to one hour.

Formalin is a very valuable disinfectant, second only to bichloride of mercury. Clothes should be immersed in a four or five per cent. solution and allowed to stay one hour.(For destroying of spores it is claimed that twenty-four hours are necessary.) To make a four per cent. solution, buy at the drug store a forty per cent. solution and dilute it by ten times its bulk in water. Formalin is also a deodorizer. It is somewhat cheaper than carbolic acid. It is like carbolic acid in being irritating to the skin; therefore care should be taken to dilute the solution very much before putting in the hands to remove the clothes.

Carbolic Acid is one of the most efficient and most frequently used disinfectants at the present time. It does not affect fabrics or colors and acts directly upon all bacteria, even spores. Unlike bichloride of mercury, its work is complete even if much organic matter is present. The right strength of solution is about five per cent. This may be made in the proportion of one pound carbolic acid to two and one-half gallons boiling water. Shake in a corked bottle until the mixture is free from the small drop formation on the bottom of the vessel.

Clothes may be disinfected by being put into this carbolic solution and left from twenty minutes to one hour. Carbolic solution is generally used to disinfect articles that cannot be boiled. It is best not to use the disinfectant on those that can be washed by using soap and water. One drawback in using this solution is that it is very hard on the hands; therefore, before removing the clothes, add a large quantity of water in order that the solution may be made very dilute and less harmful to the hands.

Lysol and Creolin are manufactured coal-tar products that may be used in place of carbolic acid. They are used in one per cent. and two per cent. solutions, and the time required for disinfection is one-half to one hour. Solutions made of either strength will not harm the skin and will do good work. These products are more expensive than carbolic acid.

Fumigation.—Clothing that must be sterilized without washing may be fumigated. Various methods are given, so the housewife may choose what seems easiest to her. In fumigating, the room or closet should be sealed so that the fumes may be more concentrated and hence produce greater results. Keep a room sealed for at least eight hours after fumigation.

To Seal a Room.—Close the windows, key holes, and door cracks with soft crushed paper or cotton. Put the potassium permanganate, the potassium cyanide, or the sulphur candle in a galvanized pail or stone crock. Stand the pail or crock on two bricks or in a larger pail of water, so that the heat generated by the chemical action or from the burning sulphur may have no chance to burn the floor or other surrounding material. Pour the formalin on the permanganate, the sulphuric acid and water on the cyanide, or light the sulphur, and go quickly from the room. Be sure to have everything so planned and ready that there will be no need to hesitate or try to go back. After leaving the room, seal it from the outside by stuffing cracks and the key hole of the door.

Formaldehyde.—*Formalin candles* may be burned, care being taken to avoid any danger from fire. (See above.)

The spraying method may be used. A sheet, two by two and a half yards, sprinkled with eight ounces of formalin, is hung on a line in the center of the room. In drying, the formaldehyde gas which is given off does the work of disinfecting. One sheet of this size is used for every thousand cubic feet or a room about 10 x 12 x 8. The room should be kept sealed for at least eight hours.

A third method is the so-called *permanganate-formalin* method. For each thousand cubic feet of air space, use nine ounces of potassium permanganate and one pint of formalin. The permanganate is placed in a receptacle and the formalin is quietly poured on it. As considerable action takes place when the two substances come in contact, the vessel in which they are put should be deep, and a protector should be put under it in order to prevent the heat generated from doing damage. The gas given off when formalin breaks up—formaldehyde—is more effective in the presence of moisture. Into the air-tight box, closet, or room which is being disinfected, moisture may be introduced by hanging up a wet towel or sheet, depending upon the size of the space treated. If steam can be introduced into the space, it will be the best form in which to bring in moisture. This may be done by setting pails or a tub of boiling water in the room.

For any mattress or heavy article that cannot be thoroughly fumigated or disinfected, there seems to be little left to do but burn. Fumigation, however, largely eliminates the loss by burning, because in the eight hours used for fumigation there is ample time for the fumes to penetrate thoroughly most articles.

In all cases of disinfecting and fumigating the Board of Health, the doctor, or the nurse will advise the housewife.

SULPHUR is of greatest service in exterminating pests. While flowers of sulphur may be used, the sulphur candle is easily obtained, and the wick helps to keep it burning. Flowers of sulphur should be wet with alcohol to insure its burning. No matter what kind of sulphur is used, allow 4 pounds for every one thousand cubic feet and have the room sealed from eight to ten hours.

The burning of sulphur involves the danger of fire, as well as the bad effects of inhaling the poisonous fumes. Therefore, the worker should protect herself by following all directions carefully, and should use special care to eliminate the fire risk.

Questions

1. How could a definite study be made as to the storage and care of soiled clothes?
2. Can any proof be made that clothes washed by the regular laundry method are not sterile?
3. To what extent can clothes be kept sanitary by daily care?
4. Problem: Prove through a comparative study of new fabrics with washed fabrics that boiling, as used in the washing process, weakens the tensile strength of the fiber.

CHAPTER XX

THE HOME LAUNDRY

EQUIPMENT FOR HOME LAUNDRY[1]

- Agate pan or basin, for starching
- Asbestos mats
- Boiler, copper bottom, 10 gallons
- *Bosom board
- Bottles, ½ doz., 2 ounces
- Bowls, enamel, 2-6 quarts
- Case knife
- Cheesecloth, 2 yards
- Cloth for tubs and boiler
- Clothes basket
- Clothes hamper
- Clothes horse
- Clothes line, 50 yards
- Clothes pins, 200
- Clothes-pin bag
- Clothes props
- Clothes stick
- Curtain stretcher
- Dipper, block tin, short handle
- Droppers
- Duster for line
- Enamel cloth for table
- Felt or silence cloth or
- Flannel
- Floor mop
- *Fringe brush
- Funnel, enamel or glass
- Iron holders
- Iron rests
- Ironing board
- Ironing table
- Irons, electric or gas
- *Fluting irons
- Heavy irons
- *Polishing irons
- Sad irons (3 to the ironer)
- Labels, 1 box
- Mason jars, 1 doz., 1- and 2-quart large mouth
- Measures, graduate
  - cup
  - quart
  - tablespoon
  - teaspoon
- Pail, galvanized iron, 10-quart
- Paper
- Pins, ½ pound
- Saucepan, enamel, for starch
- Scales
- Scrubbing brush
- Sleeve board
- Soap dish
- Sprinkler
- Strainer, wire
- Tape, 1 roll (½-in.), for repairing electric cords
- Tape measure
- Tea kettle
- Wash board, glass or zinc
- Washing devices for tub and boiler
- Whisk broom
- Wooden spoon
- Wringer
- Yard stick

Fire blanket   Fire extinguisher

SUPPLIES FOR HOME LAUNDRY

- Alcohol (denatured)
- Alum
- Ammonia
- Beeswax
- Blue
- Borax
- Chloride of lime
- Hydrochloric acid
- Javelle water
- Lime water
- Paraffin or white candle ends
- Potassium permanganate
- Oxalic acid
- Sal soda
- Salt
- Soap
- Starch
- Tea
- Turpentine

Chloroform, ether and such chemicals purchased as needed for special recipes.

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[1] See Fig. 64.

*May be purchased if required.

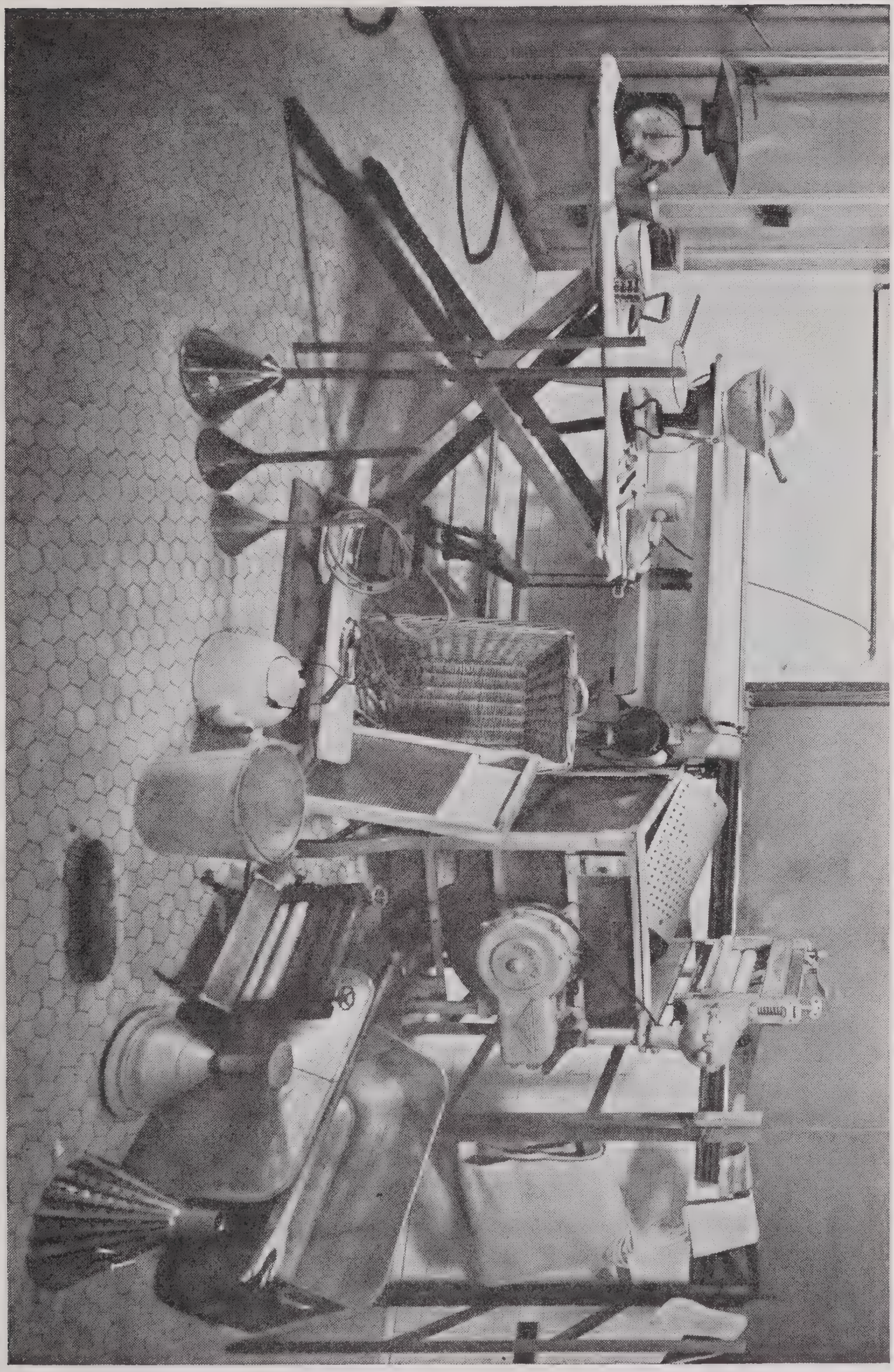
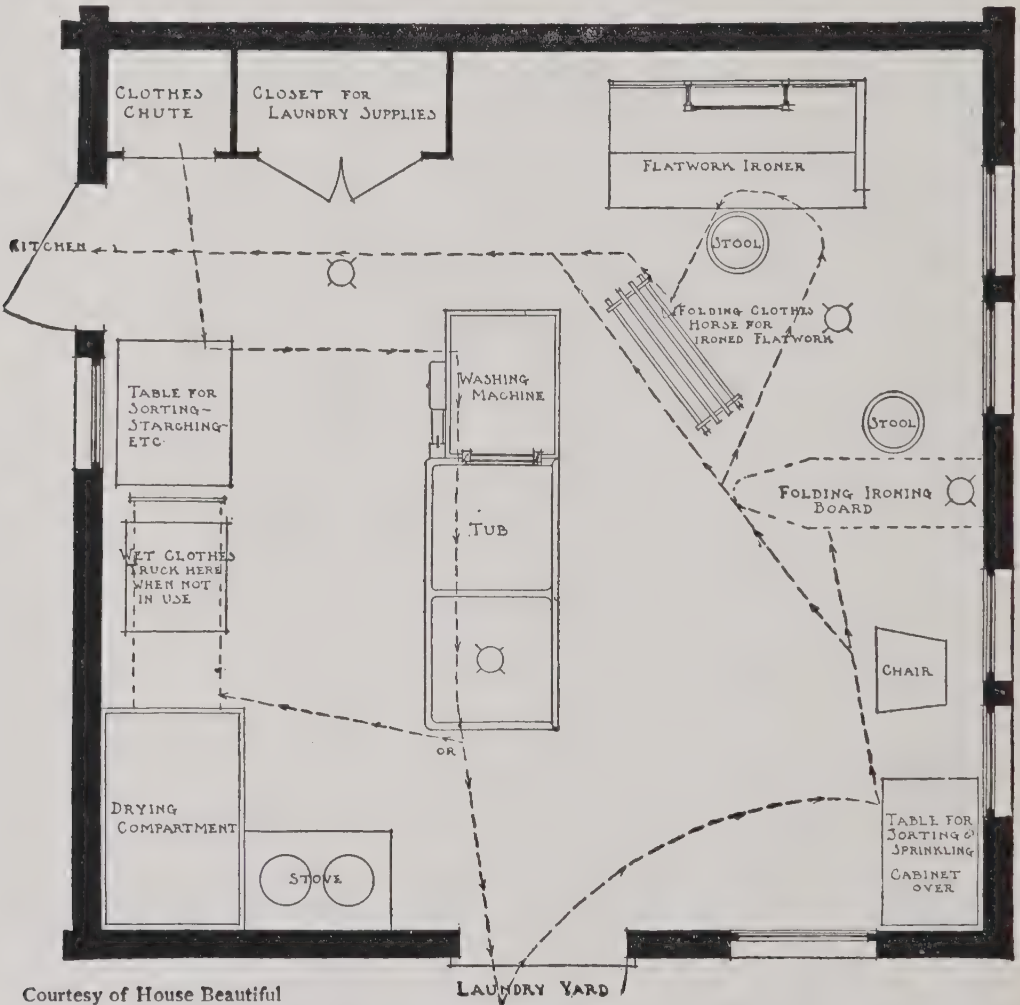


Fig. 64.—Variety of home laundry equipment, from which good selection may be made.

Situation of the Laundry Room.—The ideal situation of the laundry is one where plenty of light and air is possible. If one can foresee that the laundress is to come in by the hour or day, or is to be employed by the week as a household servant, the laundry room is better set off by itself, either in the basement, near the drying yard, or in the rear of the house. Cellar laundries should be ruled out, as there is neither sufficient light or air for good work. Basement laundries may be satisfactory if the room is half or more above ground, with good drainage, light and outside entrance. But the best place in the average house is a room adjoining the kitchen (Fig. 65). If this plan is followed, the kitchen chimney may take the laundry stove on the other side, and the kitchen plumbing may be backed up with the laundry plumbing


CLOTHES CHUTE
CLOSET FOR LAUNDRY SUPPLIES
FLATWORK IRONER
KITCHEN
STOOL
FOLDING CLOTHES HORSE FOR IRONED FLATWORK
WASHING MACHINE
TABLE FOR SORTING–STARCHING–ETC.
STOOL
FOLDING IRONING BOARD
TUB
WET CLOTHES TRUCK HERE WHEN NOT IN USE
CHAIR
OR
DRYING COMPARTMENT
STOVE
TABLE FOR SORTING & SPRINKLING
CABINET OVER
LAUNDRY YARD

Courtesy of House Beautiful

FIG. 65.—Floor plan of home laundry, 16′ square. Note relation between kitchen and laundry, and between laundry and laundry yard.

—sink on one side of the wall, wash tubs on the other side of the wall. The kitchen stove can supply the hot water; and if planned properly, one set of plumbing will serve a double purpose, thus reducing the cost.

It is a very poor plan to make the laundry a part of the kitchen, though this is often done to "economize." That it is false economy, a little thought will readily show. Confusion and hindrance—to say nothing of the inevitable mixing of foods and their odors with clothing and its odors, and the bad interchange of equipment—are the results of trying to make one room serve two purposes. If the housekeeper, or one maid, must do all the work, she will find the kitchen a very poor place in which to wash. If a laundress comes in to do this special task, the housewife will find the extra work and an extra person a great inconvenience in the kitchen. Utensils such as saucepans, spoons and measures are not suitable for laundry use unless they are free from stains of vegetables and burned foods.

The *walls* and *ceiling* should be of any finish that does not absorb moisture, and that can be easily cleaned. The most ideal finish is a glazed white brick or tiles. This should be set on an even front level, so that no indentation of plaster may hold dust. If this is too expensive, a hard plaster for wall and ceiling with white enamel paint will be economical, and from the sanitation standpoint equally good. With this kind of a wall and ceiling, a five-foot tile or glazed brick wainscoting will preserve the plaster and hence give a substantial finish. The ideal may be summed up as any material that reflects a good white light, and is very smooth and non-absorbing.

For the *floor* (Fig. 66), we may consider several materials. Small, white tile—small because the smaller tiles seem to resist the heavy wear caused by delivering heavy supplies, like barrels of soap or moving heavy equipment; cement if it has been so prepared as to have a smooth, hard finish that will produce no dust from the friction of use; a composition floor belonging to the group called spread floors, which are made under many names with many colors; or a heavy grade of linoleum of the type called battleship linoleum. This latter, to give good service, should be laid by being sealed to the floor, thus preventing water from getting under the canvas on which the linoleum is spread. If water gets underneath, the wood gets water-soaked, the canvas softens

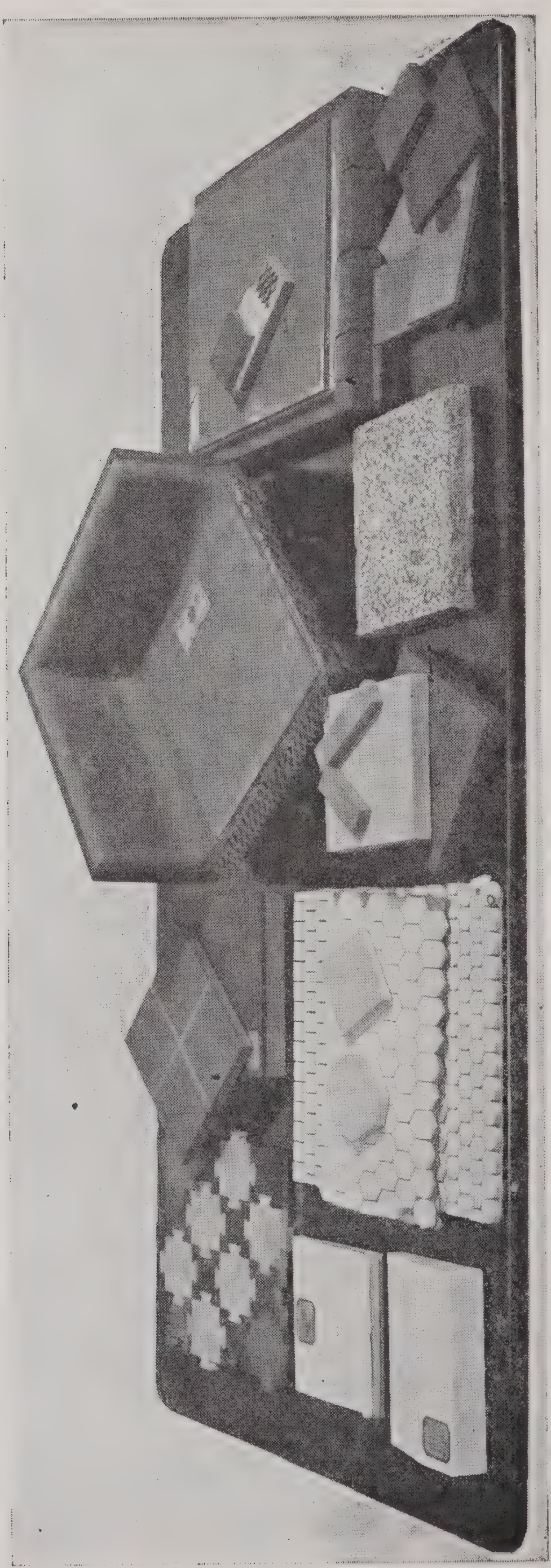


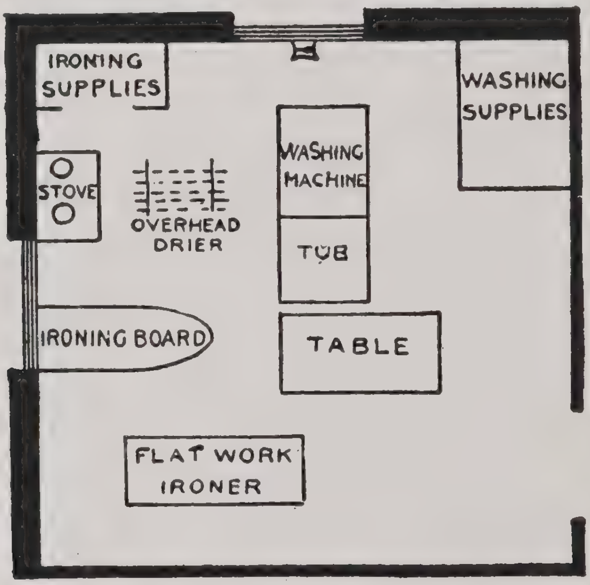
Fig. 66.—Types of flooring suitable for a laundry.

and stretches, and then the linoleum blisters or buckles, soon producing deep wrinkles, which in time crack and break. As far as cleanliness or dryness is concerned, the floors suggested above meet all the requirements. A wooden floor is less satisfactory for a laundry because it may soak water and become slippery, besides which it soon shows wear. Since wooden and linoleum floors are not very well adapted to the laying of drains, it is often most satisfactory to plan to use both cement and wood or linoleum. For instance, the section in which the washing is to be done may have a cement floor, with a sunken drain. Then the remainder of the room may have a wood floor, or a linoleum-covered one. If linoleum is to be used, it is a good plan to lay the foundation floor a little below the level of the cement section, in order that the finished floor may be on one level. Such a combination of flooring materials makes a laundry at once dry and comfortable.

The *windows* in the laundry should be large and arranged for cross ventilation; and for extra ventilation a transom over each or in each frame is good. This transom allows fresh air to enter the laundry without the hindrance of its blowing directly on the work; a direct draught not only dries the garment about to be ironed, but cools the iron. The first objection raised to this idea may be that the transoms do not harmonize with the rest of the building or are too expensive. As an alternative, one may put ventilators in the windows at the bottom. A ventilating hood such as is over the kitchen range may be placed over the laundry stove, over the ironers, and, if much work is to be done, over any washing machine. These will not only carry off heat, but will also carry off any steam that may come from boiling clothes and from drying clothes indoors on wet days. These ventilators should also be put in for the laundry class room. For the summer time, the windows and doors should be well screened, as flies seem to delight in resting upon clean clothing. An inexpensive ventilator, and one which is most efficient, is an extension cloth window screen, which sifts the dirt out of the air but allows the free passage of the air.

Arrangement of Laundry Equipment.—The wall and floor finishes not only make a laundry attractive, but add much to the possibility of its cleanliness, as well as to the ease with which the work is done. Never lose sight of the fact that cheer and comfort literally hasten work, in that the drudgery fades away when the worker's surroundings tend to keep the spirits high. A laundry can invite the worker as much as any other well-planned, attractive workshop.

In planning, keep in mind the work that is to be done, and then group and arrange the equipment to reduce labor (Fig. 67). The two distinct processes of laundering automatically establish two sections in a room—the wash room and the ironing room. They need not be separated by a partition, but they ought to be separated by an imaginary division, as it were. The washtubs or machines occupy one working center, and the ironing board or machine another. If a stove is to be used in the room for boiling clothes and for ironing, it could be placed so as to connect the two working centers. It need not be in the center of the room, however; if it is part of a drying cabinet, it is likely to be placed so that the cabinet is in the corner of the room, in order that use may be made of the two walls already established.



Redrawn from Pictorial Review

Fig. 67.—A compact arrangement for a small laundry, with a washing section and an ironing section.

Economy of plumbing more or less controls the placement of the tubs. The same pipes which supply the hot and cold water to the kitchen may have a short extension to supply the laundry. One may have to balance the saving in cost that this makes possible, against a little extra cost which may make possible better position of the equipment as to light on the work, as to better chance for placing the washing machine, and if a drier is to be established, for the saving of effort through having it near the other equipment. The tubs should be placed in good light, which should come preferably from the side. For general cleanliness, set the tub away from the wall, so that the wall and floor about it may be easily kept clean.

The *washing machine* should stand in close conjunction to the tubs. The relation of the machine to the tub should be so close as to eliminate the need of carrying or lifting heavy wet bundles, which cannot help but make wet, slippery and dirty floors. The manufacturer equips each machine with a metal chute, which should be wide enough and with sufficient incline to carry the water down into the adjoining tub. It is possible to have a chute made of galvanized iron which will extend across the two tubs from the machine. In this way the whole washing outfit may be connected, and if used carefully, will prevent overflow of water. Such a chute should be wide enough to extend as far as the extreme width of the wringer rolls; its incline, which must be steep enough to insure a rapid down-flow of the water, can be adjusted by means of a metal cleat, soldered under the upper end of the chute.

The questions always arise—Shall we have one, two, or three tubs? Will a third tub pay for itself in terms of time and work saved? If we have the expense of a washing machine, can we save by buying no tubs?

Let the first consideration be along the accepted line. Every laundry has tubs of some kind. For less handling of clothes and for quicker and more efficient work, three tubs seem necessary. There can be one tub for washing, and two for hot and cold rinses. Then before being blued, the clothes are put into a basket or one of the tubs which is empty and clean. So even with three tubs set up, the worker finally uses a fourth container. Two tubs can be used, but with more handling of the clothes because more shifts are necessary. One tub, as in some kitchenette laundries, cannot efficiently care for a large amount of clothes. The heavy flat pieces must be sent out to a laundry; if not, then pails, boilers, or baskets must be crowded into service, and the work will involve a great amount of handling.

The first cost of the tubs must not blind the purchaser to the ease and rapidity of work they will make possible, and to the general saving which is introduced and which in a year shows in its saving real money value.

If we have a washing machine, how many tubs shall we buy? If one were assured that the power which operates a laundry would never give out when most needed, if there were no need to save water, and if the water were piped to and from the machine with direct piping, one might consider that no tub would be needed. But even under the best of working conditions, there are special pieces that must be done by hand. A tub makes it possible to get these out of the way while the machine is operating.

The purchaser must consider the saving of the time cost and of the fatigue cost by having a machine properly set, properly drained, and working on a wash formula that really saves the worker. Much more depends on this last statement than the housewife may perhaps realize. As mentioned on page 55, the drain from the washing machine should be set with an inflow pipe that carries hot and cold water; and with a large outlet pipe which has a decided down-flow leading from the machine. A machine may empty into a sunken gutter—like the drain that leads to the usual trap below the floor, which is the safeguard against sewer gas. Such a drain as this is excellent to prevent the clogging of pipes with lint from the wash and to prevent the loss of small things like buttons.

The *stove* ought to be comfortably near to establish a close relationship to the tubs, especially if one boils the clothes. At the present time one may buy in-door drying cabinets that have their own gas, coal, or electric stoves (p. 238). Such a stove heats water and irons, while the arrangement of its hot-air flues, as in an oven, causes the hot air to circulate around the clothes hung in a drying cabinet which is attached. A corner of the laundry is the best place for the drier, as two walls are already established. No special light is required, but flue connections are essential to allow heat and excess moisture to pass up and off. If the drying room is just a small room, like a large closet, not a specially made cabinet, the circulation of air may be brought about by an electric fan and a small window; for heat in winter drying a steam pipe may be led around the wall of such a room. This suggestion is most practical for a school laboratory or elsewhere where it is necessary to get the clothes dried quickly.

Sprinkling is a process so essential to good ironing that it is wise to have adequate equipment. A good table is really necessary. Every laundry needs a table which may serve double duty—for sprinkling and for ironing large pieces or pinning lace. This table may be padded with felt and covered with muslin so as to be a good ironing and pinning table; or by being covered with oilcloth or a piece of linoleum cut just a bit larger than the table top, the table is excellent for sprinkling and for starching. The stain-removing work had better be done at the wash tub rather than on this table, as it is easy to clean the tub afterward, with no risk of left-over chemicals, which, while good in their place, may through carelessness create considerable difficulty and loss.

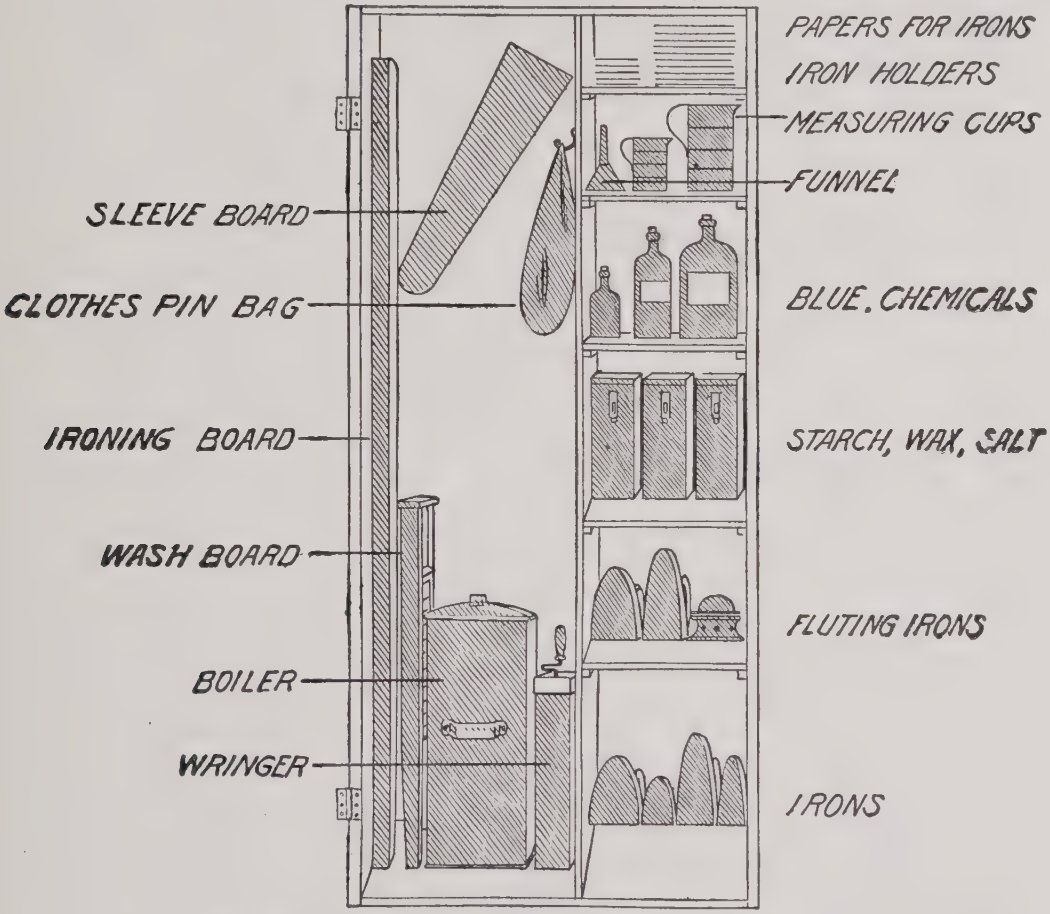


Fig. 68.—A laundry closet for the small home laundry.

The ironing section of the room should have good light, in order that the worker may be able to see when the wrinkles are ironed out; good light also lessens the risk of scorching clothes. Whether an ironing table, a skirt board, or an ironer is used, place it near the windows, and if possible, so the light will come from the side of the worker.

An efficient laundry need not be an expensive, luxurious one;

it may be expensive and luxurious only to the point that the worker has a proper tool for the task she is about to perform. The choice of tools and equipment comes after some study and investigation, perhaps some experiment, to get the best results for the money it is possible to spend. For example, a ten-cent sprayer, attached to a cork which will fit almost any four- or six-ounce bottle, will sprinkle the clothes as quickly and as well as a so-called clothes sprinkler which costs forty to fifty cents, and more evenly than is possible by hand work.

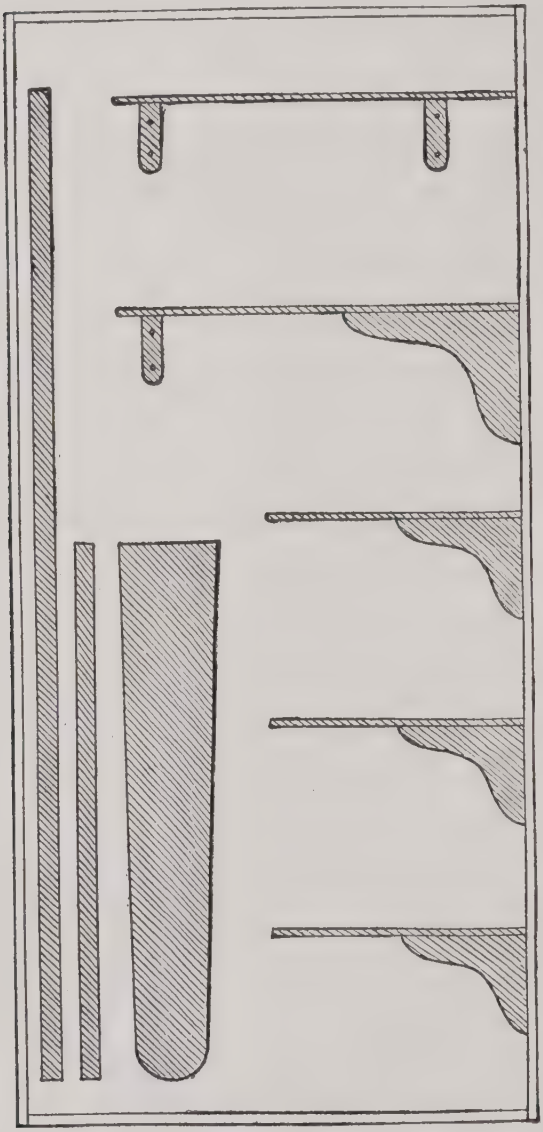


Fig. 69.—A one-section laundry equipment closet.

The *small equipment*—devices or tools—may be grouped near the working field on shelves, or better still, in two small closets (Figs. 68 and 69). An arrangement which adds to efficiency is one where the tools for each process are so placed that the worker walks directly from one set of working equipment to the next. Two closets, one for small ironing equipment, and one for washing equipment, may be most convenient; they will also keep equipment in good condition. Let the one or two closets be built with shelves sufficiently far apart to hold the various equipment and supplies. If there is one closet, have one-half for equipment and one-half for supplies. Narrow shelves for bottles and jars, so narrow that there can be but one row of bottles, make it easy to see quickly the various things needed. Spaces may be planned in this closet sufficiently large for the clothes boiler, and for the wringer when it is not one permanently attached to the washing machine. A rather high, narrow compartment will take the skirt board and the bosom board; even the curtain stretchers could stand in the back of this space. A hook conveniently placed for the bag containing the clothes pins and the clothes line, and good, substantial shelves for irons, saucepans, starch, bluing, and a goodly quantity of soap, complete the arrangement. With the room well lighted and well aired, equipment and supplies well bought, and a little study as to the best methods, one will find that the drudgery of laundry work is largely eliminated. The work then becomes a science, an art, and consequently a pleasure.

PIECES OF EQUIPMENT

Wash Tubs.—As has been already stated, one to three tubs should be in every laundry. A tub and a sink combination will be found most useful where a washing machine and one tub are considered. Stationary tubs are most convenient, as they eliminate lifting and can have an outlet drain easily connected, even if hot and cold water piped to them is not possible. These tubs are made of various kinds of material, varying in price so as to come within the means of everyone. A single tub without plumbing connections is what is considered in a plumber's estimate. The fixtures are extra, because faucets vary much in quality.

A few suggestions will help in the choosing of a tub. Wooden set tubs are cheap, but not durable, and hard to keep sweet and clean. Concrete and stone are easily cleaned. Slate is not expensive, and is serviceable for a cheap tub. Soapstone tubs come in single or combined sections. The color is gray, the material fairly durable, but porous, and hence subject to stain. Porcelain tubs are of two kinds: solid or enamel lined. They are easily cleaned with soap and water or a little kerosene, and they resist stains. The expense varies according to the amount of porcelain used, whether as a lining in various thicknesses or as solid porcelain. A solid porcelain tub costs about twice as much as an enameled iron tub. A heavy porcelain lining has good wearing possibilities and is not likely to crack or chip. Yellow porcelain and gray slate soapstone are not good tub colors as they afford no possibility for contrast between the yellow or gray of the clothes and that of the tub.

A stationary tub (Fig. 70) should be set sufficiently high so the worker's back is straight, allowing the bending forward at the hip. For a woman five feet five inches tall, the top rim of a tub can be about thirty-six inches from the floor. Gas piping will make legs of the desired height, if those belonging to the tub are too short. The faucets should either be bell type, or they should be set above the tub, so that by no chance the clothes may catch on them and tear. A combination faucet carrying both hot and cold water will be most convenient for filling the washing machine. If the machine is of the type where the tub is stationary, the water pipe can be conducted to the side of the machine and then with an arm set high the water can be easily turned into the tub. If it is not possible to have the water piped to the machine directly, it probably is possible to pipe the hot and cold water to a combination faucet, which has a screw similar to that for the garden hose and to which may be screwed the hose used to fill the machine. There are patented fillers and drainers which work syphon-fashion in conjunction with the plumbing.

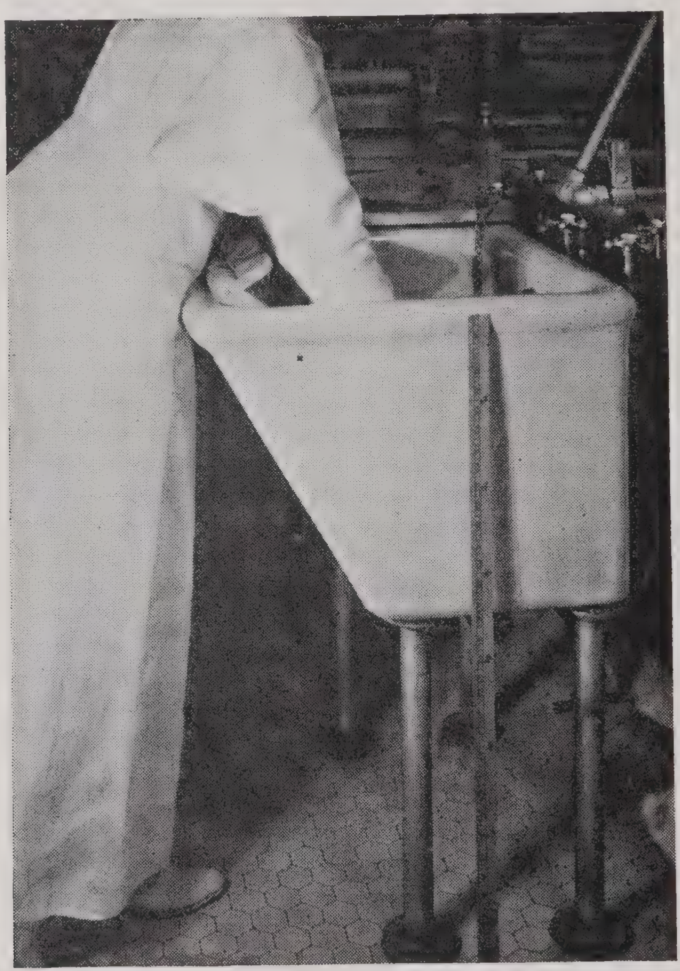


Fig. 70.—Height of working surface for wash tub.

If the expense of a stationary tub seems impossible, galvanized iron, wooden or papier-maché tubs may be bought, and they may stand on a bench. These benches are usually too low, but they can be blocked up to make them higher, and so lift the tubs. Even this simple, inexpensive equipment may be made stationary, so far as the rack is concerned, and hot or cold water piped to the tubs. Holes may be made in the bottom of the iron or wooden tubs, and a plug put in for drainage to a pipe or trough. It is not necessary to secure expensive equipment in order to make it serviceable and complete, because so much depends upon the practical use of any equipment.

Wash Boards.—Wash boards vary considerably in sturdiness and durability. Cheap ones are apt to go to pieces rapidly under the effects of hot soapsuds and hard rubbing. The chief materials —tin, zinc, and glass—have both advantages and disadvantages. Tin and zinc are durable, but apt to tear the clothes. Glass, on the other hand, gives a good rubbing surface, but is broken easily either by a fall or by very hot water. All wash boards need care to prevent rotting and warping of the wooden frame.

Wringers.—A wringer greatly assists in relieving the work of hand washing (Fig. 71). The wringer for a stationary tub would give the greatest help if it had reversible action, so that it could be put between two tubs and used for either by shifting the water board (Fig. 72). Wringers can be purchased at varying costs, but it pays to consider the better quality, which should mean hard rubber rolls, heavy side springs, and ball-bearing action. The electric washing machines are usually equipped with their own wringers, which are operated with the same motor that washes the clothes. The care of the wringer does much to counterbalance the cost price. It should always be left with the pressure off the rolls when not in use, as this will prevent the rolls from flattening. Wipe the wringer dry and slip on a cover, which may be simply a loose bag. If for any reason the rolls are badly stained, they may be wiped off with a cloth moistened with a few drops of kerosene. Use little kerosene, wipe quickly to dissolve only a thin layer, and finally wash thoroughly to remove all oil. Kerosene removes the stains because it dissolves rubber, therefore none should be allowed to remain on the rolls.

Stoves.—Stoves for the laundry are almost legion. They are designed for burning wood, coal or gas (Figs. 73-75), and specially shaped to hold the clothes boiler and irons. The coal and wood stove should heat the water, heat the irons, and have a place to boil the clothes or the starch. These stoves need not be large to do all this work. The stoves connected by flues to the drier serve double duty (p. 210). Stoves with open tops, such as gas plates and kerosene stoves, which have no metal surface between the flame and the face of the iron, will give better and more economical service if a piece of sheet iron, cut larger than the burner top, is used to hold the irons. Such a plate distributes the heat evenly to several irons without waste; in addition, the irons are not exposed to the rust formed by the deposit of moisture on cold metal.

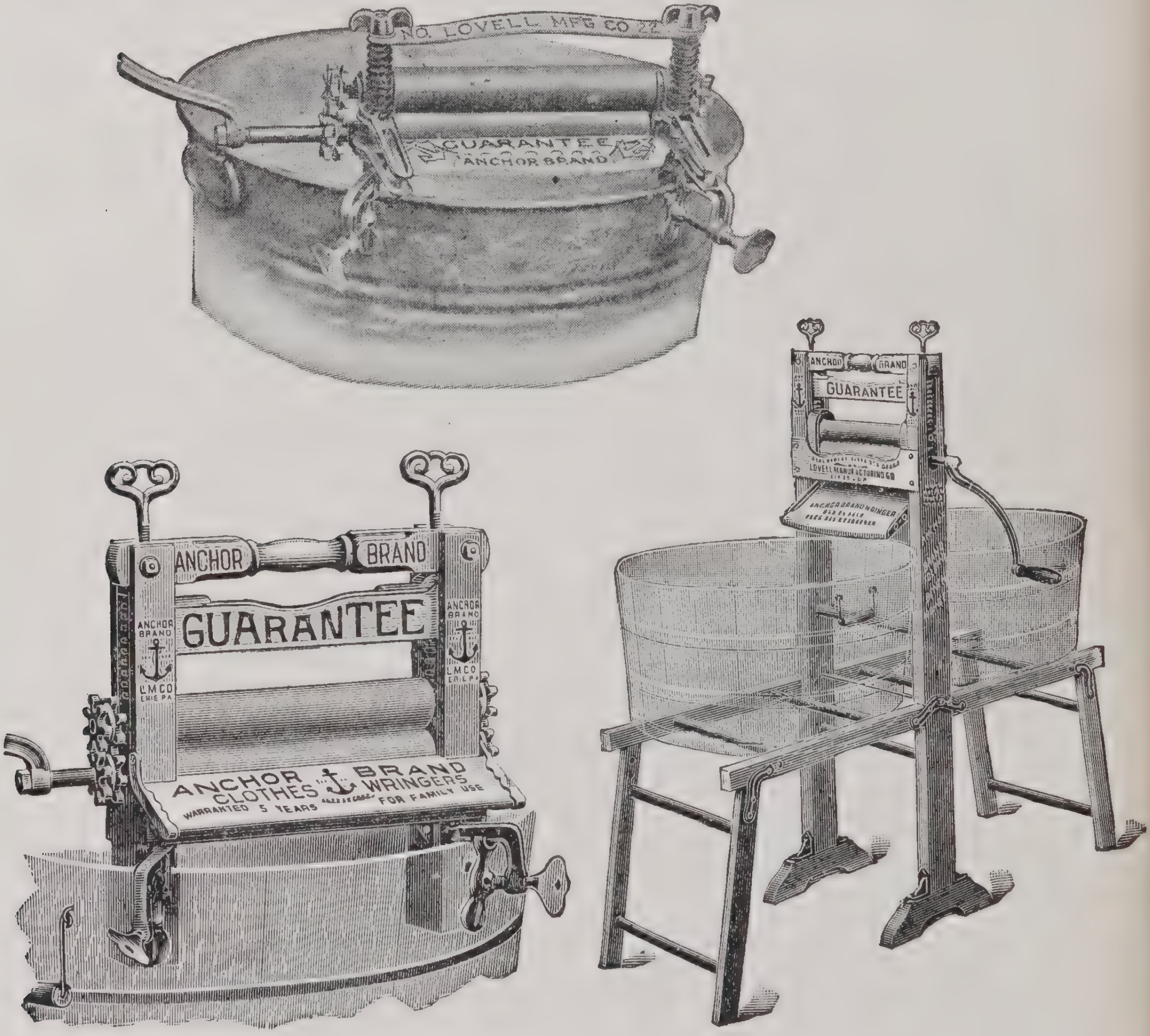


FIG. 71.—Wringers suitable for use with portable tubs.

Clothes Boilers.—Boilers seem very necessary equipment to most housewives. For years the feeling has been that only boiling will make clothes white. It will help, but if the garments were well soaked to free them of the loose dirt, and well washed, then thoroughly rinsed until free from all suds, boiling the clothes would be less necessary to clean them and would only be necessary to sterilize them. Soap, sunlight and air, together with the heat of ironing, are all purifiers, which are effective except in cases where disease germs must be subjected to a high degree of temperature.

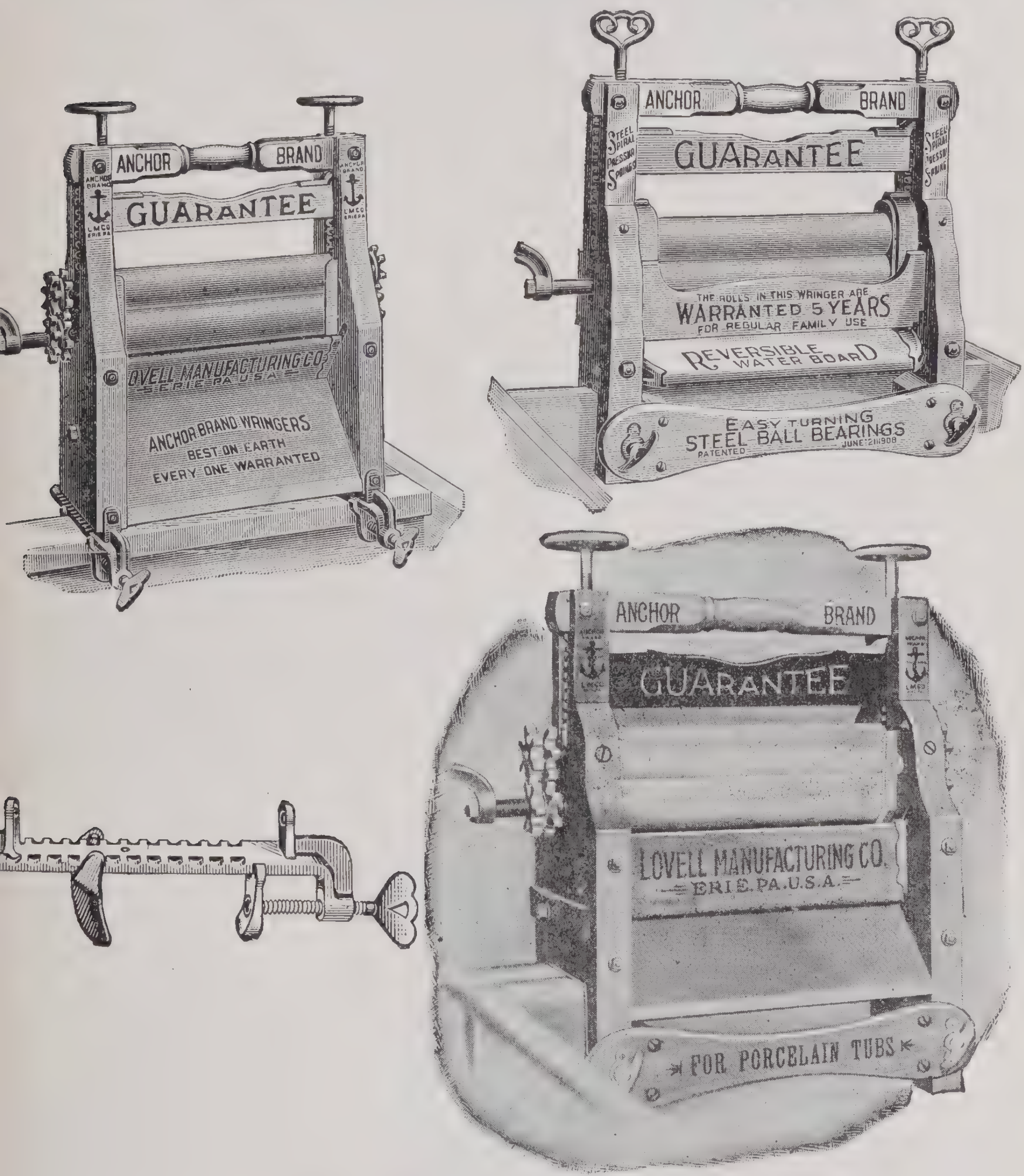


Fig. 72.—Wringers for stationary tubs.

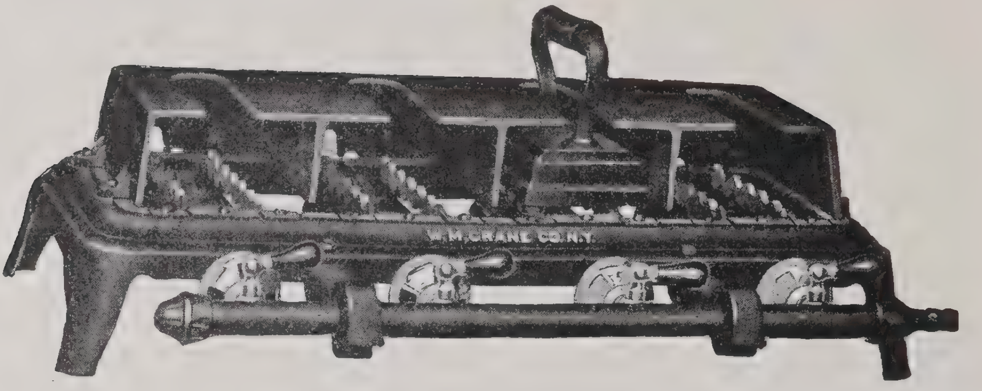


Fig. 73.—Gas laundry stove.

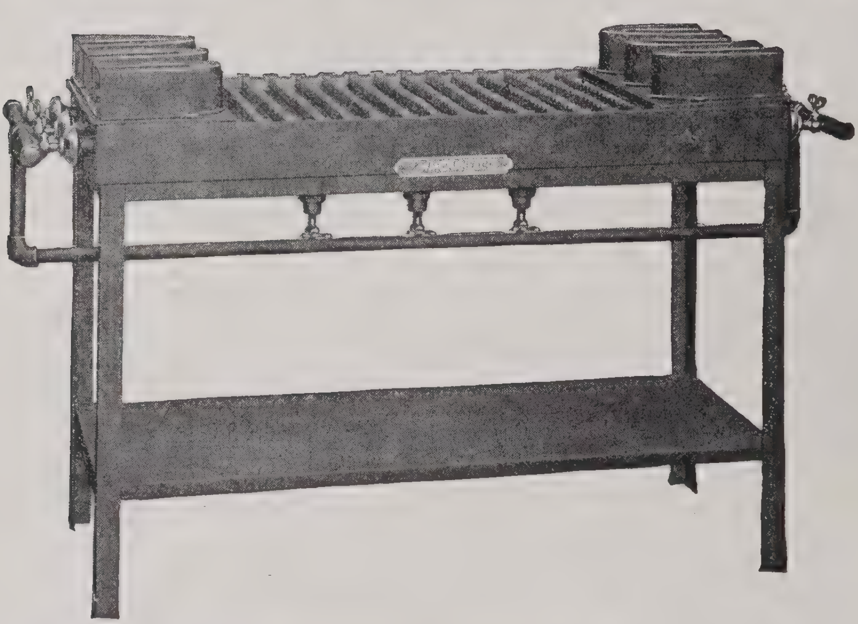


Fig. 74.—Gas stove that heats both the clothes boiler and the irons.

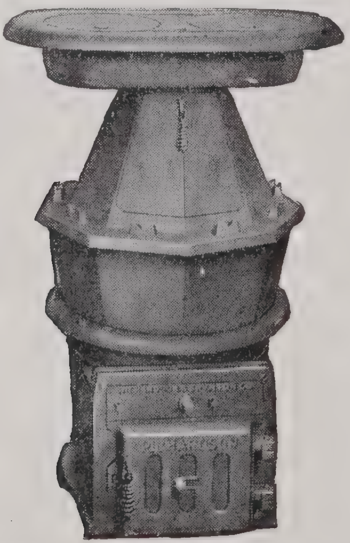


Fig. 75.—A coal stove designed for heating irons. A boiler may be connected with this stove, providing a hot water supply for the whole house.

It is possible to have a copper clothes boiler—such as most homes have—set on a metal standard so as to be on the same level as the washer. Under this boiler may be set a small gas burner which heats the water content of the boiler. A faucet led over the boiler and an outlet pipe set in the lowest side level will make it possible for any worker to have water for work without heavy lifting and carrying.

Hand-Washing Machines and Devices.—Machines and devices were never so helpful as at the present because designed to fit many individual needs. It behooves the housewife to consider the various principles of machines and devices; to consider the greater economy—whether it is to spend time and energy doing the work herself which leaves little for the better, broader things of family life, or to purchase a machine, the first cost of which is large, but which does all the heavy work for her, if she is willing to modify her methods.

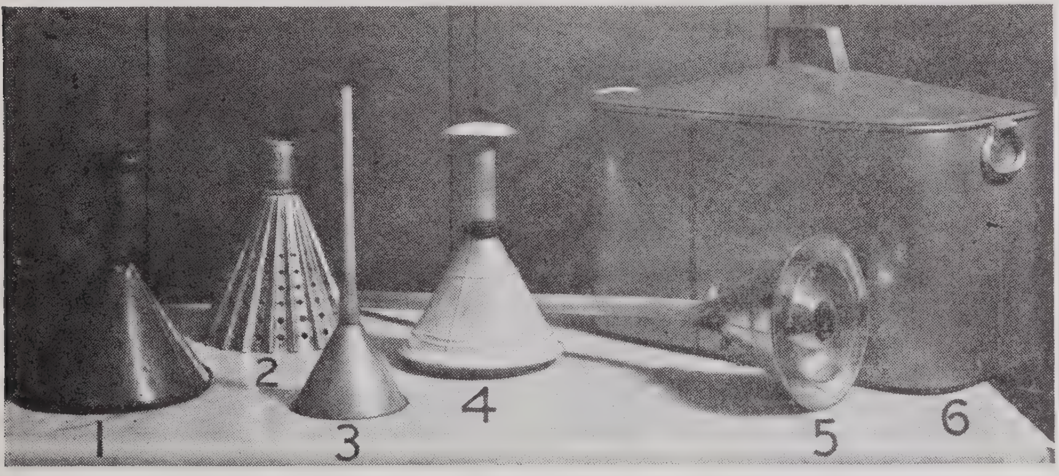


Fig. 76.—Small washing appliances. 1, 2, 4 are used in the boiler and act like a coffee percolator. 3 and 5 are suction washers—3 is a ten-cent funnel on a stick.

Hand-driven machines are labor savers, because, working with them, one can do many more pieces in a given time and with less effort. They are not the greatest labor savers, because it must be acknowledged that a mass of clothes absorbs and holds a great deal of water and becomes very heavy. Keep such a machine well oiled so that it will operate as easily as possible. No matter what the power, a washing machine is constructed on one of several principles, cleaning the clothes either by friction, by pressure and suction, or by agitation; and all types displace dirt by forcing soap and water through the fabric.

A number of small washing appliances must be grouped with the hand-washing machines (Fig. 76). Several devices are in the form of a vacuum boiler, on the principle of a coffee percolator. A device of this kind is easily handled, light in weight, easily kept clean, and costs little. It is used in the bottom of a clothes boiler, funnel side down. The clothes are distributed evenly around it, the boiler filled with cold water to which shaved soap or soap chips has been added. If the special stains have been removed, the soaking in cold water and the slow heating will remove the usual ones, such as egg, meat juice, oil, cream, etc. The cleaning is brought about by the expansion of gases due to the heat. As the water heats, the gases, which have been cold and hence contracted. expand until they force the water and suds to jet up through the

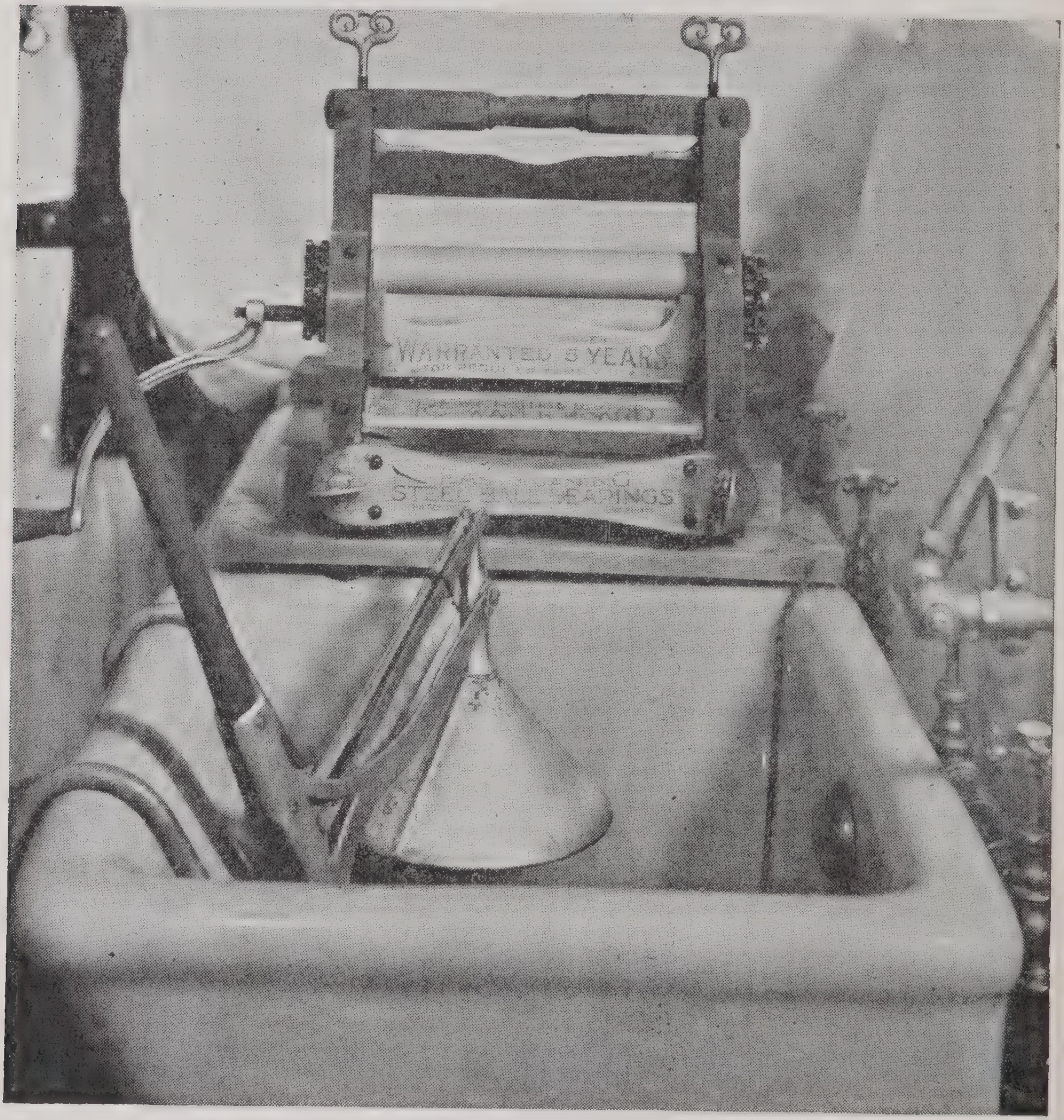


Fig. 77.—Funnel type washer to be used in stationary tub.

percolator and over the clothes. This action leaves below within the funnel a vacuum, which the suds rush in to fill. In this way a circulation is formed, the force of which does the cleaning. This washer would not be chosen for colored clothes, unless for those proven to be fast colors, or for woolens, because boiling would shrink and harden them. It is such a good labor saver, and is so inexpensive that it cannot in any sense be considered a luxury.

Again, there is the funnel type whose principle is that of a suction washer (Fig. 77). It is a hollow cone, and may be bought for any type of wash tub; where set tubs are not in use, it can be purchased with a galvanized iron tub, mounted on legs, with a water outlet in the bottom (Fig. 78). This machine has its own gas or kerosene heater, so that the clothes may be boiled in the tub. The ease of the leverage is increased by a heavy spring, which draws the funnel quickly away from the clothes. The same washer has been adapted to light work, such as lingerie or baby's clothes; it is much smaller than the regular machine, with a tin drum like a round tin boiler. It can be put on the stove to heat the special garments that may need to be scalded. Its capacity is about four towels. There are various other suction washing devices, which are easy to operate and efficient. With a long handle attached, such a device would give good service in camp work as in washing in a stream (Fig. 76). Such a device may be made at small expense from a broom handle and a heavy tin funnel. Fit the broom handle tightly into the funnel. Soaking will swell the wood sufficiently to wedge it in the funnel without the use of tacks or screws, which might rust.

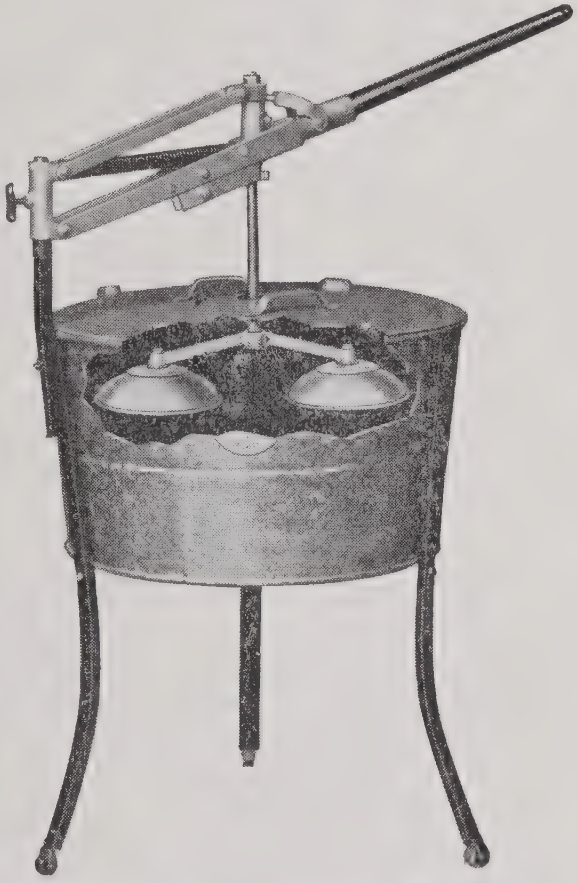


FIG. 78.—Funnel type washer with its own tub.

Types of Power.—Many of the washing machines on the market may be bought either with hand or power attachment. The kind of power available will be a determining factor in the choice of a machine.

ELECTRICITY.—There are two types of electric current, the alternating and the direct. Knowing the difference between these two currents is not so necessary for the housekeeper as for her to know which of these two types of current she is to use. A D.C. motor does not usually operate on an A.C. current, or *vice versa.* The local electric company will of course furnish information. The alternating current is more often used, so that the motors which are to operate sewing machines, washing machines, ice cream freezers, electric fans, etc., are likely to be alternating motors, but one can buy any of these machines with direct current motors if one but asks for them.

Besides knowing the kind of electric current, one should know the voltage of the current. As the current is most often alternating, so the voltage is usually 110. Home lights and home machines, then, are usually operated on alternating current and 110 voltage; but one should make inquiry of the local electric company before buying electric appliances and equipment. A low-voltage electric utensil cannot be attached to a high-voltage line without overheating and melting the wiring in the machine or device.

The following definitions of terms and table may be of assistance in understanding the use of electricity.

D.C. means an electric current that runs in one direction over the wire.

A.C. means an electric current that alternates, *i.e.,* goes back and forth in waves with great rapidity, allowing an instant's time at low power and another instant at high power.

Alternating current can be carried at high voltage. The voltage can be stepped down by a transformer (frequently located on the street pole) to a safe pressure for household use. In this way a farmer may secure his supply of power even from high pressure transmission lines.

Storage batteries cannot be charged from an A.C. current without a small converter. House bells are sometimes operated on A.C. current by means of a transformer.

Cycle means the period it takes for the alternating current to

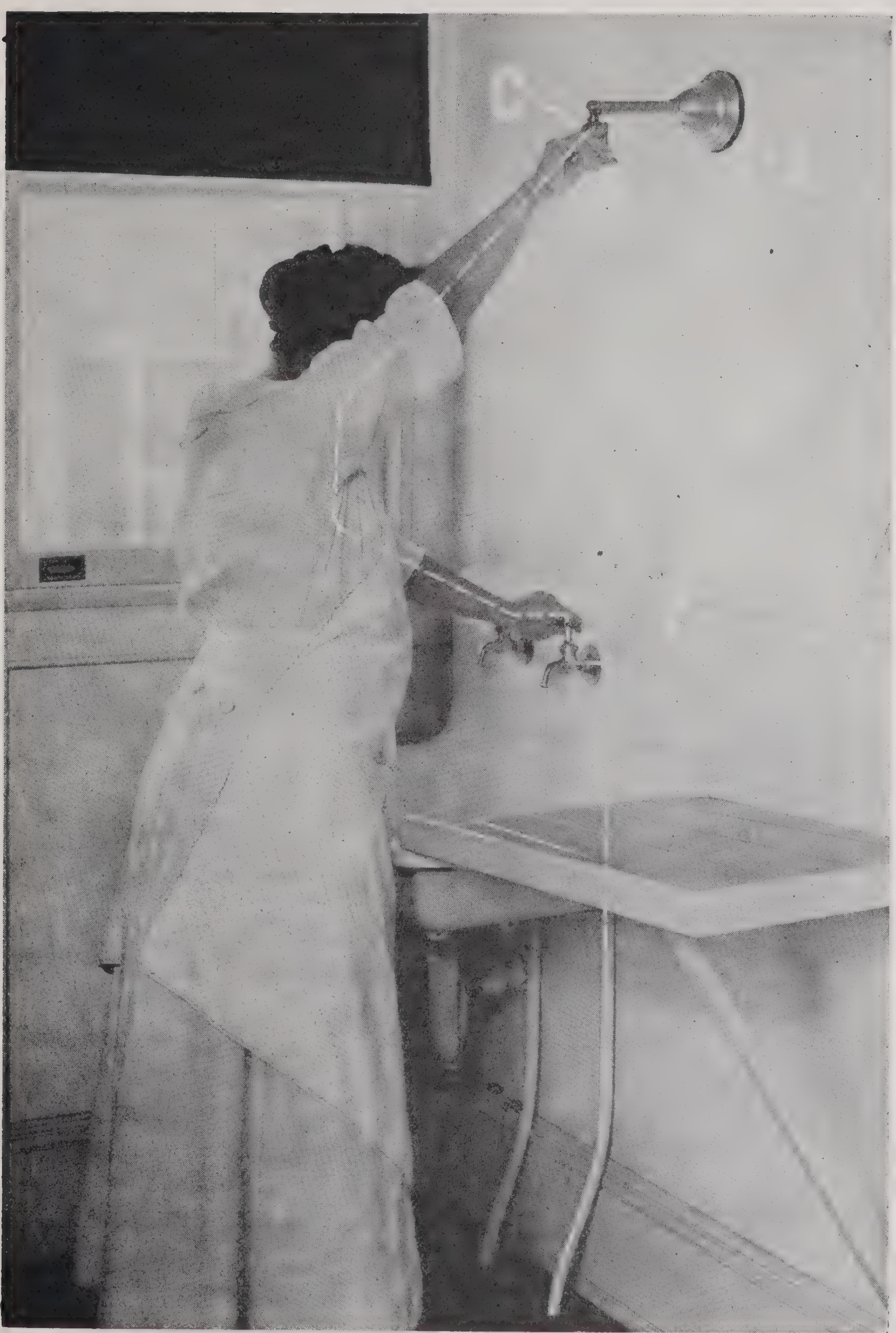
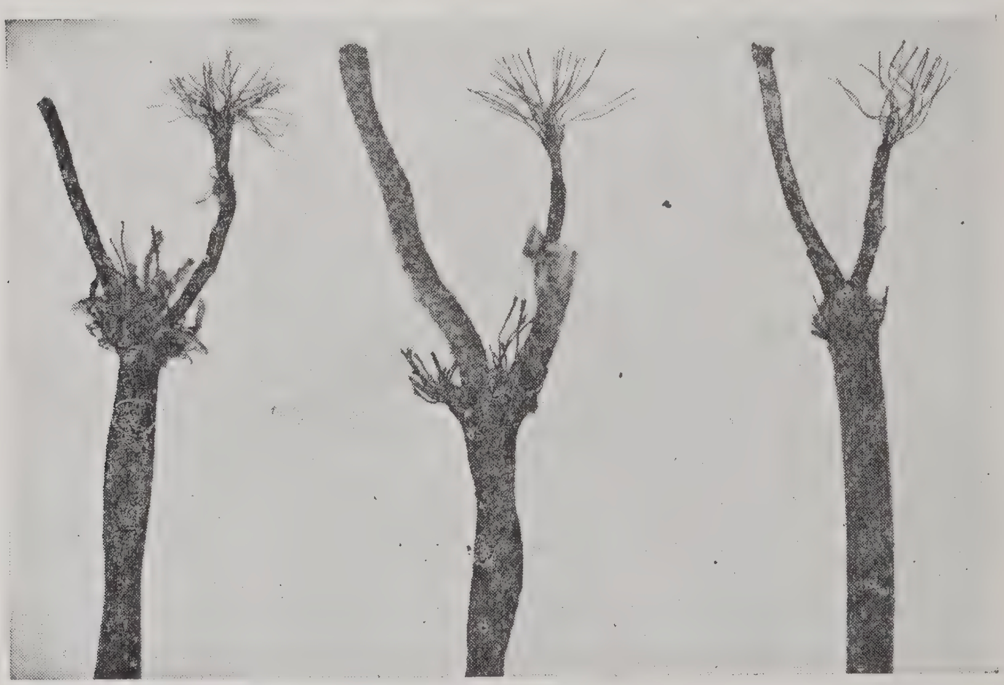


FIG. 79.—Illustration of the possible danger from shock by the passage of electricity from the metallic ungrounded fixture C (see insulating ring at base of fixture A), through the body to the grounded water faucet at B. Path of electric current is indicated by broken line through body.

flow back and forth. A 60-cycle current (common for house use) flows back and forth 60 times per second.

Switch controls the entrance or shut-off of the electricity.

Fuse is a safety device which "blows out" when the circuit is overloaded, thus preventing more serious consequences. (See, however, Fig. 94.) Sometimes the addition of an electric iron, toaster or curling iron to an already overworked circuit will blow a fuse. Turn out some of the lights before putting on an iron; especially is this necessary if one is connecting devices on a lamp socket and has no strong wall outlets for equipment. Fuses can be easily replaced, but this should always be done by a person who knows how, and with the current off. (See Fig. 167.) The plans for a house should include plenty of wall outlets.

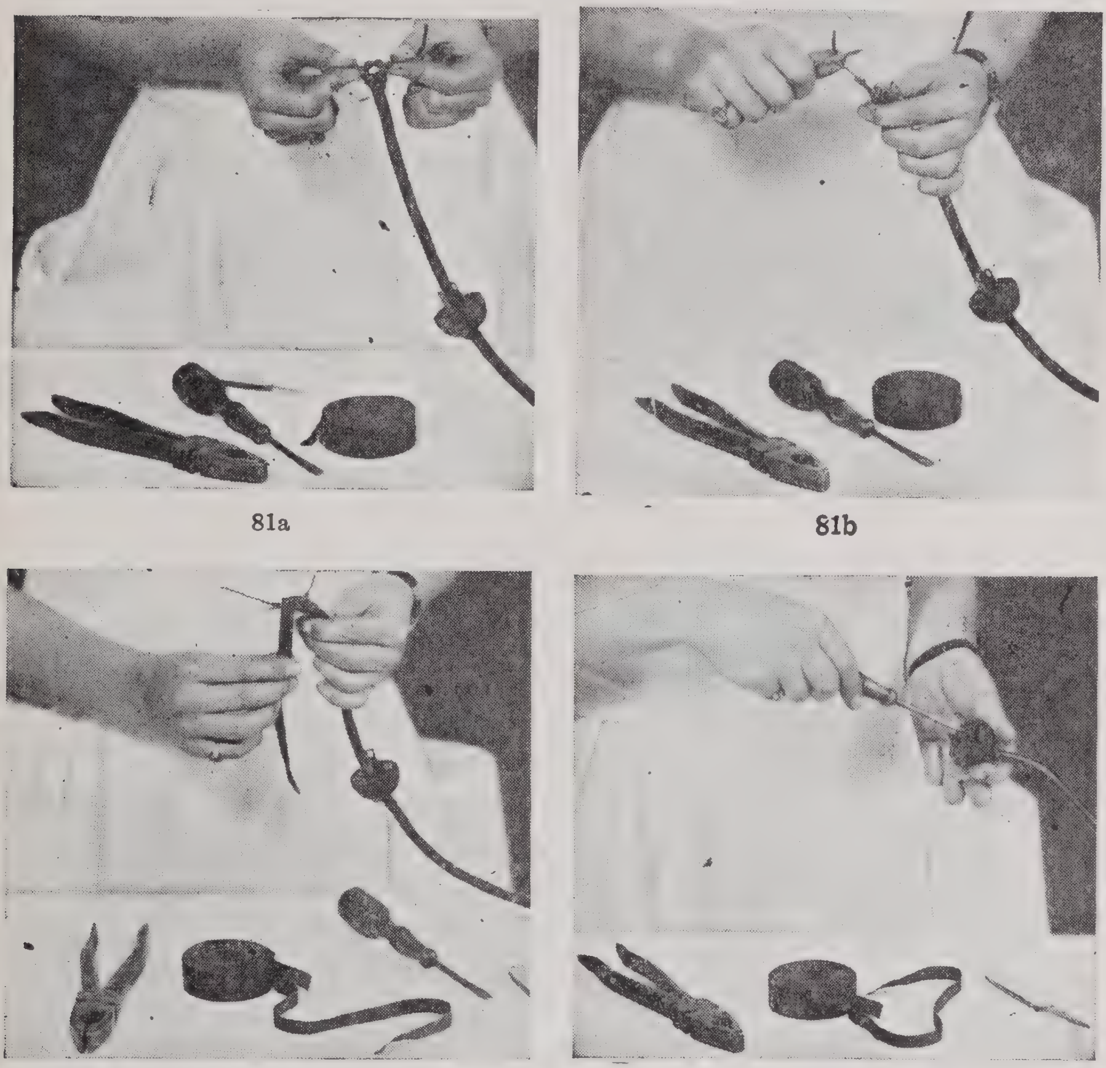


Courtesy of Good Housekeeping Institute.

Fig. 80.—Illustration showing fine wires of which electric cords are made

Short circuit usually means that accidentally a good conductor has been introduced between the two wires which results in an abnormally large flow of current thereby melting a fuse.

Electric cord connects the machine with the power outlet (Fig. 80). It must be kept in perfect condition, dry and unbroken. Breaks in the insulation should be repaired at once, as uncovered wires may cause short circuit (Fig. 81). Disconnect cords by gripping the plug—never pull the cord. Disconnect from the device first, then turn off the electricity at the socket. Protect the wire from contact with metal by using porcelain protectors. (See also p. 309.)



81a 81b

81c 81d

Courtesy of Good Housekeeping Institute.

Fig. 81.—Steps in mending an electric cord.

Table of electrical terms:

ohm (0) = unit of resistance
ampere (A) = rate of current flow
volt (V) = pressure
watt (W) = fraction of horse-power (volts × amperes)
kilowatt (KW) = 1000 watts
kilowatt-hour (KWH) = kilowatts × hours

To help you to reckon:

$\text{O} \times \text{A} = \text{V}$
$\text{V} \div \text{O} = \text{A}$
$\text{V} \times \text{A} = \text{W}$
$1000\ \text{W} = \text{KW}$
$\text{W} \div 1000 \times \text{hrs.} = \text{KWH}$
$\text{KWH} \times \text{Rate} = \text{Cost}$

To read meter:

Electricity is measured by a meter which indicates the number of watts used; as a watt is a small unit, the distributing unit of electricity is the kilowatt, or a thousand watts. Our electric bills then are in terms of " kilowatt hours," that is, the number of hours that we have used a thousand watts of electric current. To read the meter (Fig. 82): A complete revolution of the right-hand dial indicates 10 kilowatt hours; the next dial indicates 100 kilowatt hours; the third indicates 1,000 kilowatt hours; the last, on the extreme left, indicates 10,000 kilowatt hours. In reading, read from the right-hand dial to the left, and read the lesser of the two numbers between which the hand rests. To obtain the consumption, subtract the reading at the beginning of a period from that at the end of a period. If the dial on the meter has " multiply," multiply the difference accordingly; if the dial is plain, as above, the reading is direct, and gives the actual consumption in kilowatt hours. The reading above is 8 plus 30 plus 500 plus 0000, or 538 kilowatt hours.

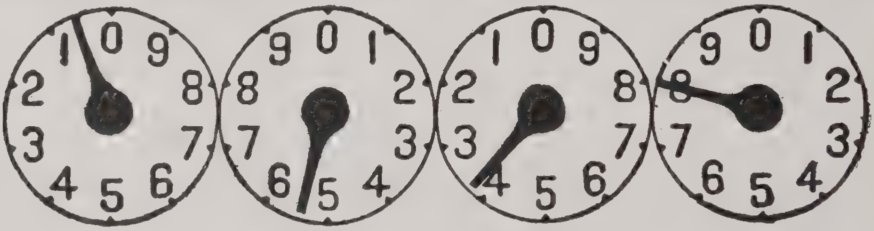


Fig. 82.—Dial of a watt-hour meter.

Water Motors are satisfactory if there is a sufficient flow of water, but are not to be considered if one must pump water to store it for power, or if the water tax is very high. The motors usually produce about one-half horse-power of energy. At least twenty-five to forty pounds of water pressure are necessary to do the work of an eight-sheet washer, or ten pounds dry weight of clothes. A piston water motor is operated like a piston with valves in addition. The water forces the piston to a point at which the valve opens and lets out the water. The piston is moved back until it automatically opens another valve which lets in more water. This water pushes the piston forward and to the place where the first valve is again opened. The force of the water must be strong enough to force this piston.

Another water motor is built like a turbine water wheel. The water flows through the wheel and as it pushes it around it gives power for the work. Here again the motor is dependent upon the flow of water.

Gasoline Engines, which may be used for other purposes, such as pumping water or sawing wood, may also run the washing machine. Such an engine must be operated by a person who thoroughly understands its mechanism, and who has learned to interpret any irregularities in its action. Some washing machines are better adapted to this connection than others, because they are equipped with a pulley wheel so that they can be operated by power from engines.

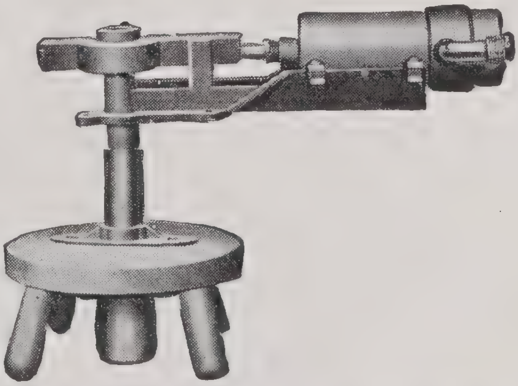


Fig. 83.—"Dolly" or milk-stool that agitates the clothes in the suds. This illustration shows a water motor.

Power Washing Machines.—All machines must operate on the principle of displacement of soil by soap and water. There are many applications of this principle, some of a very special nature, and not included among the types mentioned below.

Types.—The majority of the machines on the market may be grouped into five types. One is called the " Dolly " type; in this the " Dolly," which is like a revolving milk stool (Fig. 83), usually revolves in the center of a tub containing soap and water through which the clothes are drawn. (See Fig. 84.) In a few machines the dolly is stationary, while the tub revolves. Care should be used in this machine, as in all others, that it is not over-packed, because the weight of the wet clothes causes much dragging. Any over-packed machine runs the risk of tearing and cannot clean thoroughly, no matter what type it represents. The cleaning principle of this " Dolly " machine is agitation and friction.

Another group of machines cleans the clothes by *friction.* This friction is brought about by corrugated disks or semi-circular boards which rock or revolve with the clothes between them (Fig. 85). With either machine the clothes are rubbed between these two grooved pieces of wood. It is really a double washboard device, and unless care is used, it will surely rub the clothes much more than is desirable.

A third group, the *rotary* (Fig. 86), revolves the clothes and hence agitates them in a cylinder-shaped cage. These machines are constructed with two cylinders; the inner, perforated cylinder, made either of wood or of metal, is like a cage which holds the clothes (Fig. 87), and revolves in the outer cylinder which contains soap and water. It is the type of machine that is especially constructed to make the various required shifts of water, soap and bluing without the machine being stopped. The big machines have steam connected to the outer cylinder so that with the machine still in action, the clothes may be boiled or sterilized. This type of machine is the same as that used in large laundries. The cheaper

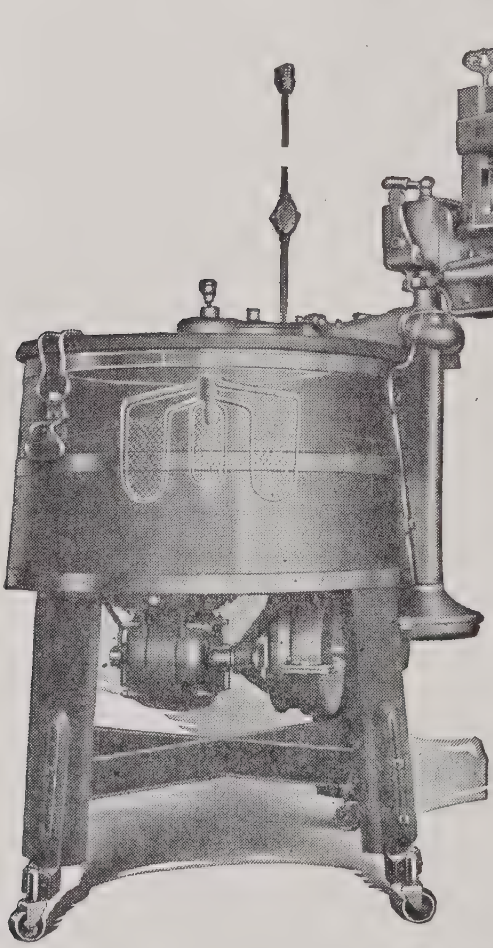


Fig. 84.—"Dolly" machine with perforated paddles.

of these machines, if power-driven, may rotate in only one direction, whereas the reverse action is desirable to keep the clothes loose. Hand-driven rotary washers usually may be turned or reversed at will according to the desire of the worker. The reversing of the action increases the efficiency of the machine by keeping the clothes from packing, and producing a readjustment of the wet garments that increases the cleaning action. A rotary machine which does not reverse its action depends upon larger "lifts" or cleats, which keep the clothes from roping. The machine should not be overcrowded, so there will be sufficient room for the clothes to "drop" from the top of the revolving cylinder to the bottom as the inner cage revolves. All rotary machines should allow a "drop" of the wash. Some of this type revolve by means of the action of a paddle wheel agitating the water so forcefully as to cause the cage to revolve in the water. This type of rotary washer

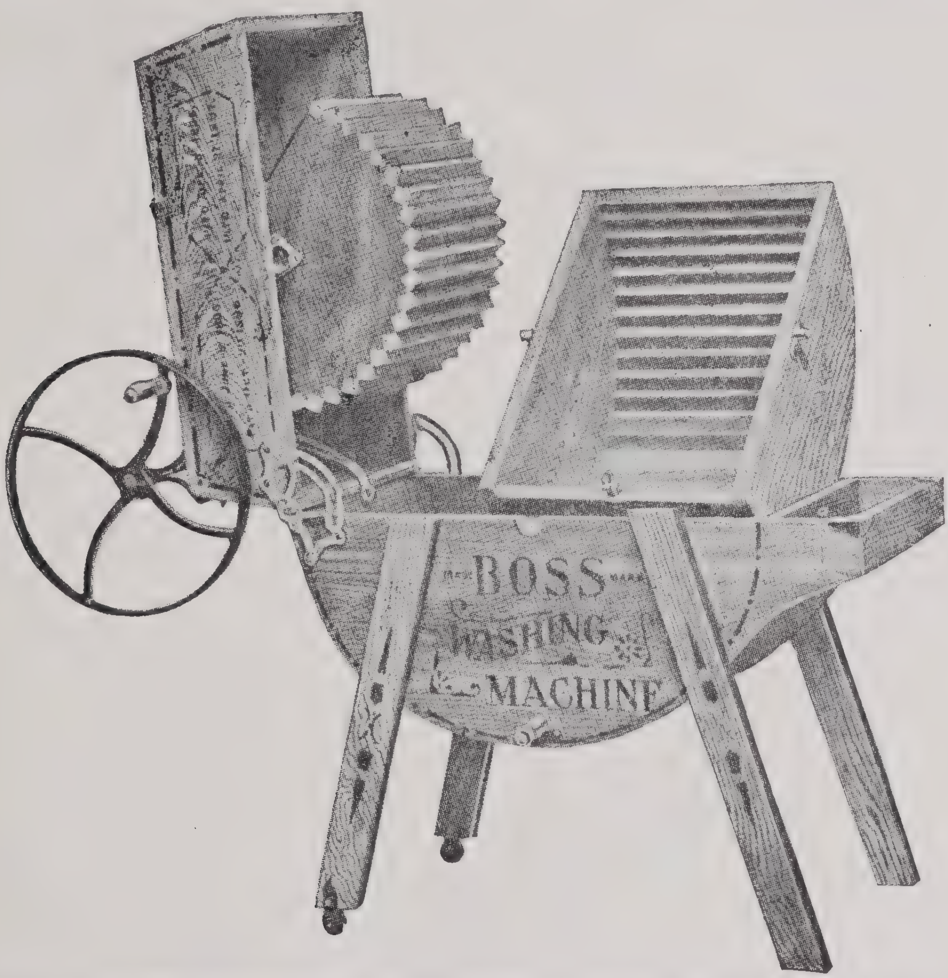


Fig. 85.—Corrugated semi-circular type of washer. Operated either by hand or by power.

works on the basis of the motor boat, and, like a motor boat, which must have its propeller covered if the boat is to go, it is dependent upon a large quantity of water. The amount of friction in all rotary machines depends on the amount of water used (p. 77). There is less friction when a machine is crowded with clothes and when the water is in too large quantities. Too much water is wasteful of soap, of water, and rarely cleans the clothes well, because it prevents the " drop " with its resulting displacement.

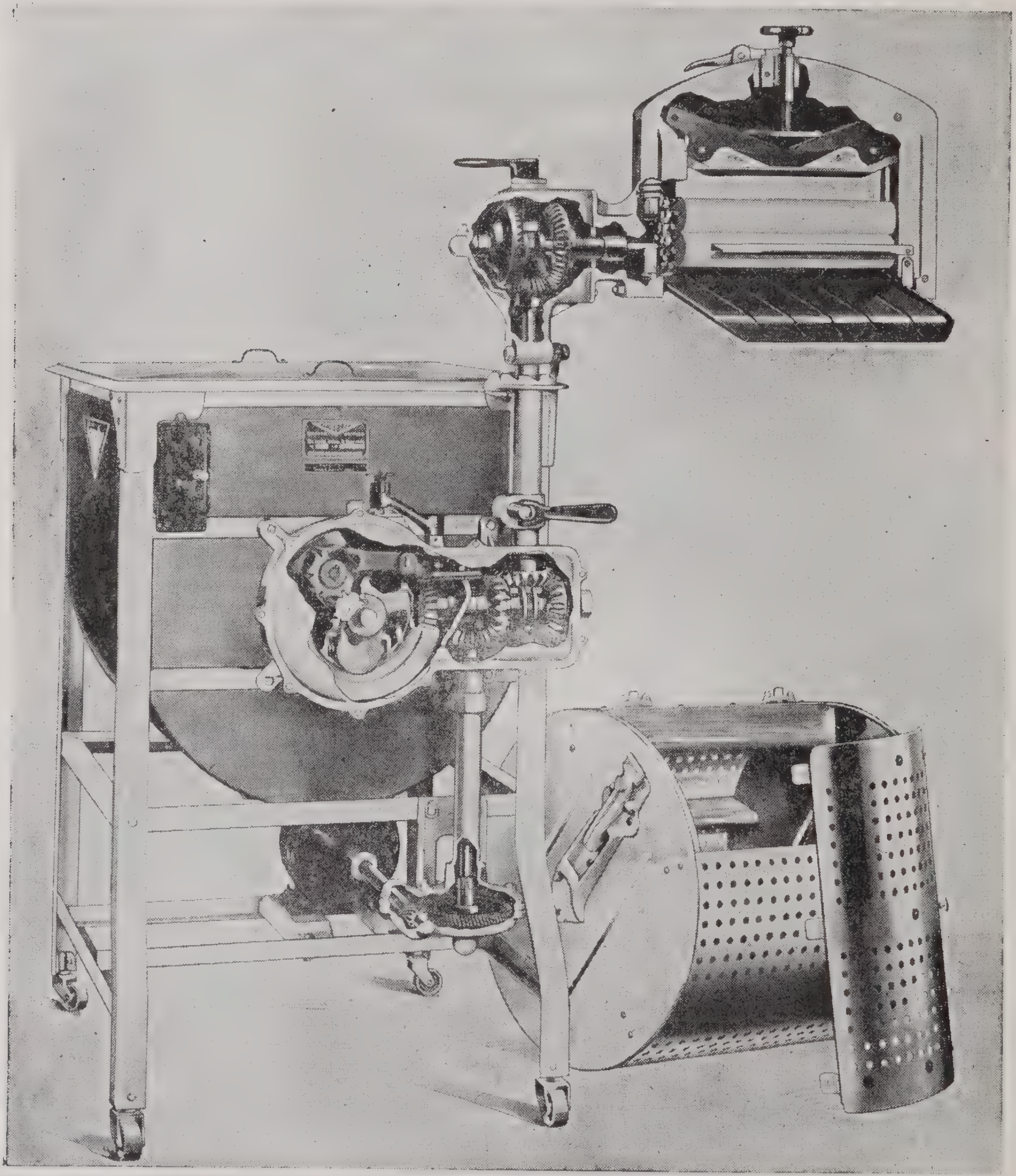


FIG. 86.—Rotary type washer.

A fourth type of machine, the *pressure and suction* principle, is spoken of as a suction washer (Fig. 88). Metal cones are attached to a lever which presses the cones down against the clothes, then suddenly a spring lifts them away. A suction is caused which draws out the dirt previously loosened by the pressure. There are three adaptations of this type of machine—one with its own tub, another that is placed in a set wash tub (Fig. 89), and a third which is constructed like the first in most details except that its efficiency may be increased by the use of an extractor basket in the tub to

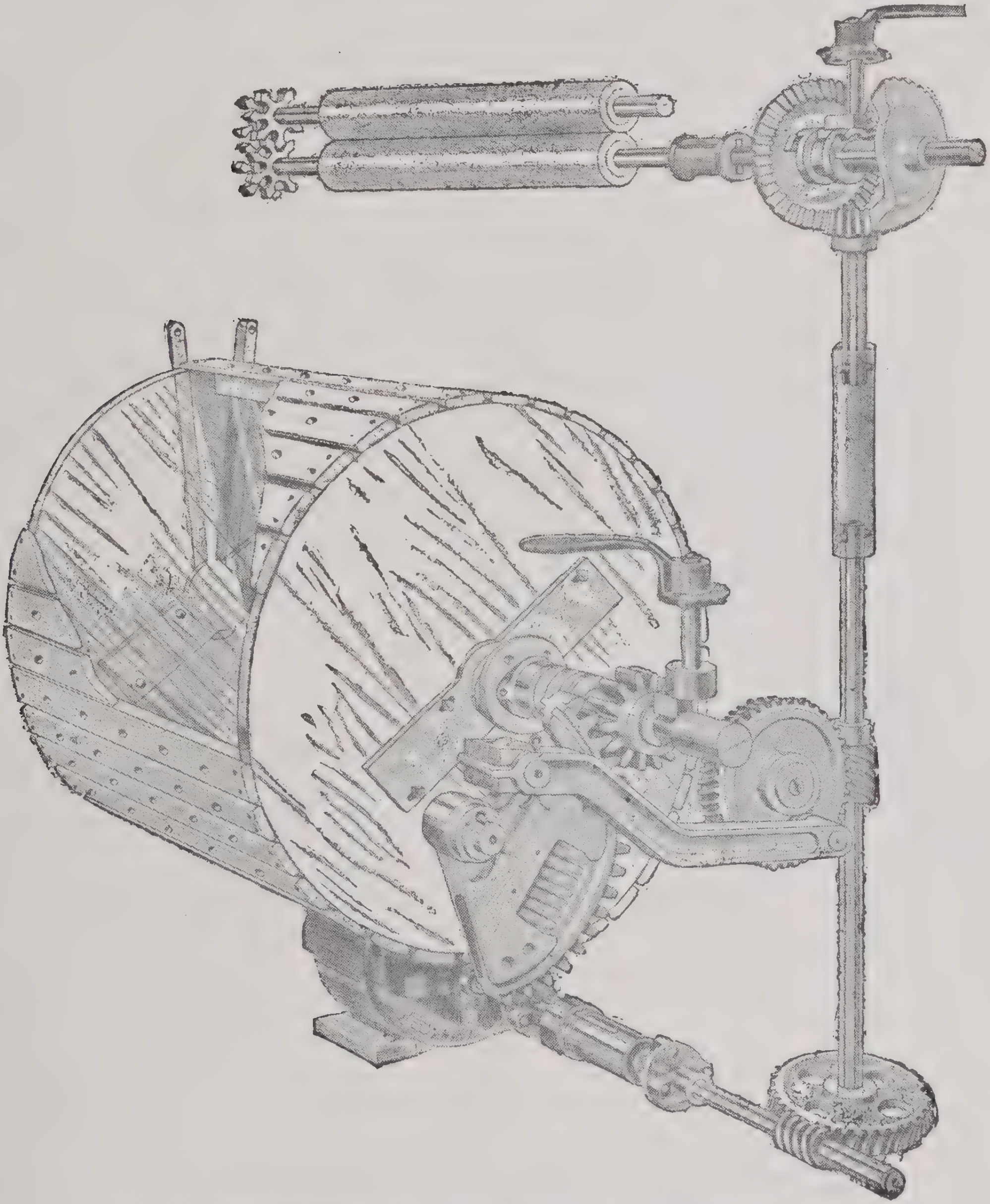


FIG. 87.—Skeleton view of a rotary washer, showing working parts.

take the place of a wringer (Fig. 90). In this last machine the plungers cannot be lifted or lowered to suit different amounts of clothes.

When the extractor in this machine is to be used to prepare the clothes for the line, the perforated cage inside the tub is lifted out of the water, clothes and all; the wash or rinse water is allowed to drain off, then the perforated cage is revolved; the centrifugal action brought about by this revolving throws out the remaining water. (See p. 84.) The action of this extractor must be slow because an extractor operating at high speed is very dangerous, besides causing a great deal of vibration. In about twelve to fifteen minutes the extractor will dry the clothes enough to make them ready for ironing; less time will dry them sufficiently for hanging on the line.

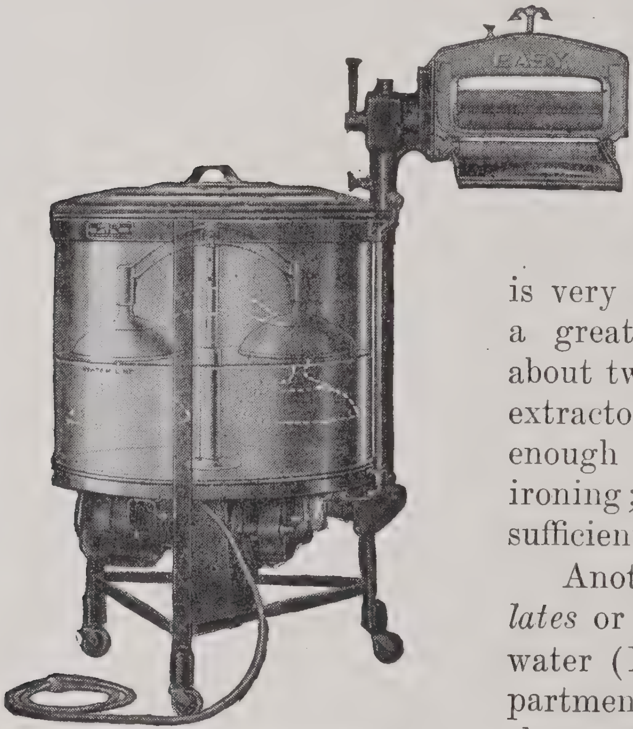


Fig. 88.—Pressure and suction type washer.

Another type of machine *oscillates* or rocks the clothes in soapy water (Fig. 91). The clothes compartment rocks cradle-fashion and cleans the clothes by throwing them rapidly from one side to the other. This rapid throwing creates a forceful displacement, hence the cleaning is rapid. The throwing of the clothes produces some friction.

Any of these machines will do good work, if not overloaded and if given sufficient time. The machine, of course, does not produce any chemical cleaning action beyond what water and soap may do. Special stains, such as ink, dye, or iron rust, for example, must be taken out individually. They would not wash out by hand; why expect the machine to dissolve them? There need be no tearing if one does not overload the machine and is careful in taking the clothes from it, and if care is used with the wringer. Use the machine according to the best methods (p. 55). Very fine lingerie, or a number of little pieces like handkerchiefs or collars, can be placed in bags made of coarse cheesecloth or net bags especially made for the purpose, which may be bought in any laundry-supply house (p. 298). These supply houses will be found in all large cities. The nearest one may be learned from any public laundry or hospital laundry.

Capacity.—The smaller power-driven machines have their capacity measured by the number of double sheets that they can wash at one time. If a machine is said to wash eight double sheets, perhaps better work will be found to result by attempting only seven. Full-sized tablecloths would be counted as sheets, four or five towels are equal to a double sheet, and three aprons to a sheet, etc. It would be much more accurate work to establish the size of the wash by the pound weight. About ten pounds of dry clothes may be washed in most of the electric home washers.

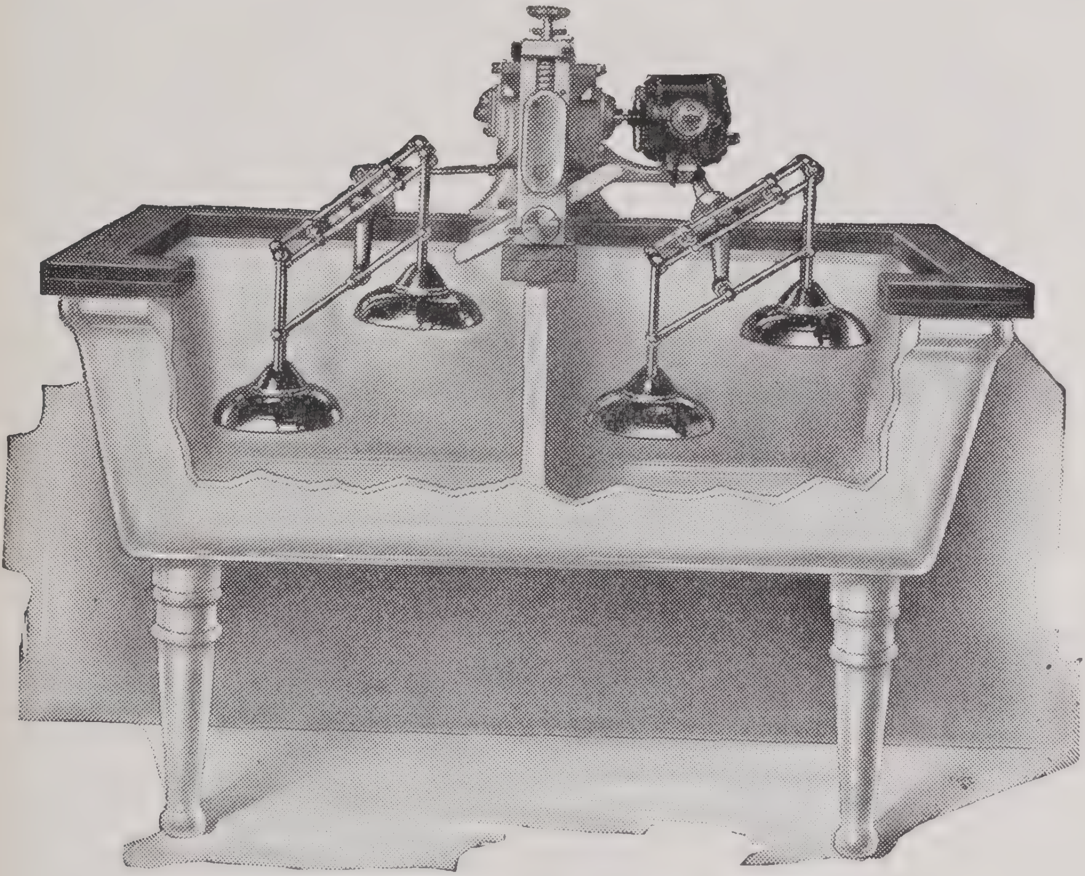


Fig. 89.—Pressure and suction type, for use in stationary tubs.

Materials.—A wooden washer will wash the clothes as well as a metal one and costs less, but requires more care. It gives the greatest service when used in a place which is not constantly heated, because if left dry in a heated place, it shrinks and leaks water. To prevent this drying, a moistened sponge may be kept in the tub between wash days. A wet sponge is better than letting water stand in the tub, as water standing for any length of time will become slimy. Soap and water will keep the wood clean. Machines should be allowed to dry after use, and the cover should be adjusted loosely to keep them clean and still allow circulation of air in the machine. A metal machine will not leak, but will corrode or show a white, filmy deposit, due to the soda in the soap or in washing solution. This is easily removed by rubbing with kerosene and washed off with soap and hot water. Rotary and dolly washers are often made in two styles—all metal or all wood.

Motors.—When the type of machine has been chosen, the purchaser should ascertain the current upon which a power machine is to operate. (See page 222.) The motors upon which these machines operate are ⅛, ¼, and ¾ h.p. A ⅛ h.p. motor is small for heavy or continuous work. So the housewife would be wise to request a ¼ h.p. motor, even at a little additional expense, especially if she plans to operate the machine on the "shift-of-water" system. (See p. 56.)

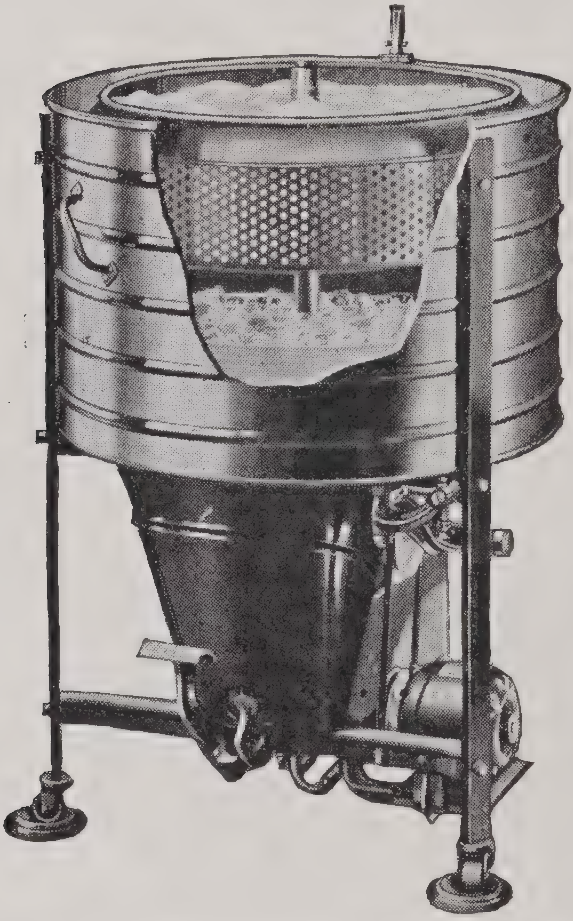


Fig. 90.—Pressure and suction washer equipped with extractor basket.

To Set Up the Washer.—As has been said, the washing machine should be placed in working conjunction with the wash tub. It should be connected with the drain by as large a pipe as possible, so as to have quick delivery of soiled water, and then by a combination piping heading in a single faucet, the hot and cold water may be led into the machine directly. This faucet is like those generally found in the bathroom for the attachment of the bath hose, but it should be larger. The outlet pipe should drop directly to the drain, with as much of a graduated incline as possible because an elbow will allow lint to collect and clog the pipe. For the machines that oscillate, a trough drain is necessary, and the machine must be brought to a standstill to be emptied. This outlet pipe connection with a washing machine should have most earnest consideration, as it reduces the time to a great extent and the fatigue to a minimum. (See p. 55.) A few machines have a loose, fitted sieve at the drain hole. This is a great help, because it prevents the clogging of the pipes by lint.

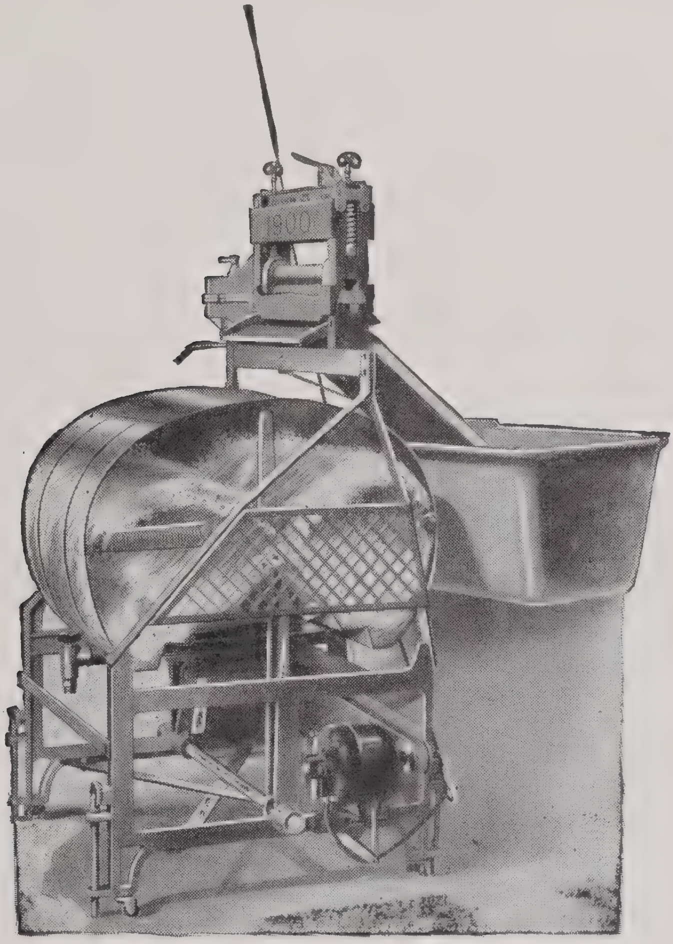


Fig. 91.—Oscillating washing machine.

To Operate the Washer.—The operation of a power washer is not difficult if the housewife understands enough of the mechanism to know what she is trying to do. She should not attempt to operate the machine until she has mastered the printed instructions accompanying the washer, or has had the method demonstrated by a representative of the manufacturer. This precaution will save many accidents and repair bills. The use of electricity involves many risks if the worker is ignorant of these possibilities or is careless in her handling of electric current. Figures 79, 93, 105, 106, 165, and 166, show proper precautions to be taken in the use of electricity.

See that the machine is well oiled according to the rules sent with it, and any belts tight enough to save power. Have the soap in solution. Develop a good formula and work by it (See p. 74). All garments are well done by machines, but the fundamental principles of washing methods must be carefully considered. The principles presented in the earlier chapters for washing each kind of fabric can be easily adapted for use in a washing machine.

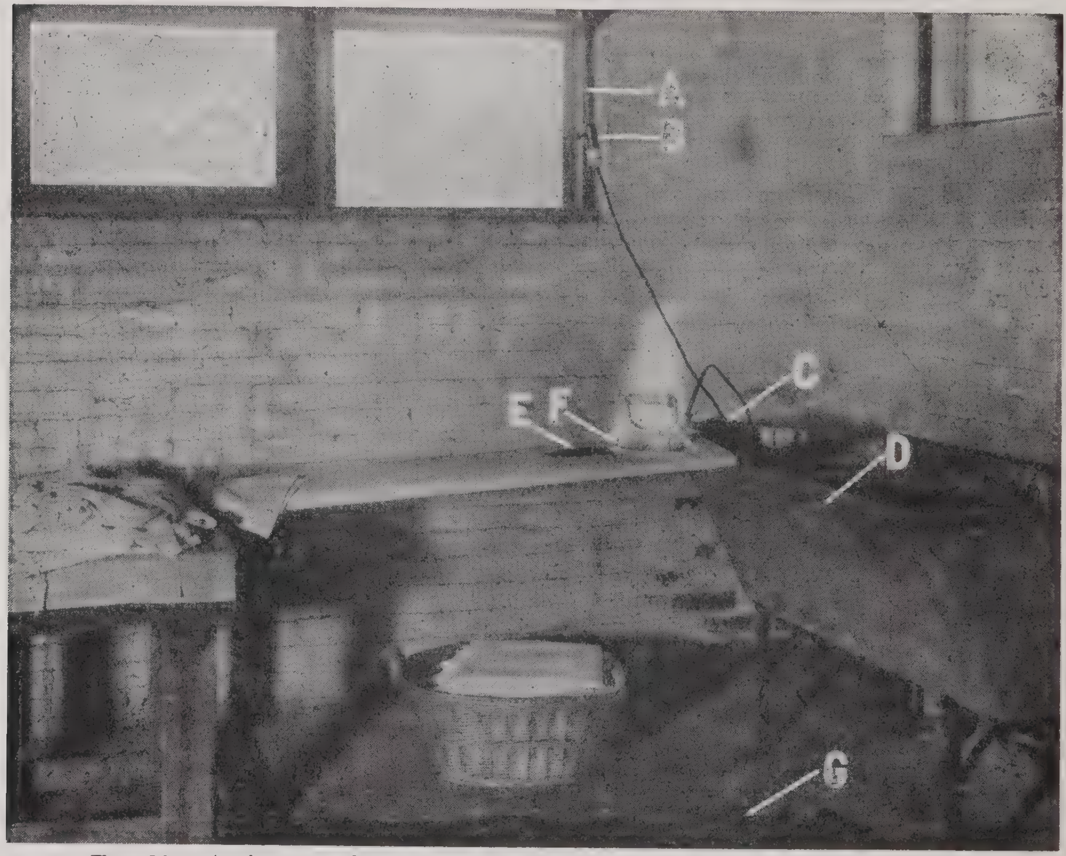


Fig. 92.—An improperly equipped and inadequately protected arrangement.

Note the metallic shell socket B with nonreinforced lamp cord A, the necessary proximity of the worker to the grounded laundry tubs D and the damp concrete floor G which makes a condition exceedingly favorable for receiving shocks. Carelessness is indicated in leaving an iron on the board while connected to the service, as shown by E and F, where the stand C should have been used, giving rise to fire hazard. This is probably one of the most frequent causes of electrical fires.

Water Softeners.—The average housewife will question the need or economy of installing a water softener in the home. They are, to be sure, one more piece of equipment to buy. But in localities where the water is hard, they are valuable additions, which soon pay for themselves in saving of pipes, of cost of cleaning supplies, especially soap, and of clothes. (See also pp. 124, 296.)

Starching Outfit.—The pans for starching and for cooking starch should be chosen with the thought of having material which is easily kept clean and non-rusting, and the cooking saucepan should be heavy enough to prevent scorching. A wooden spoon, a quart measuring cup, a tablespoon, a teaspoon, and a strainer of fine copper wire will complete the outfit.

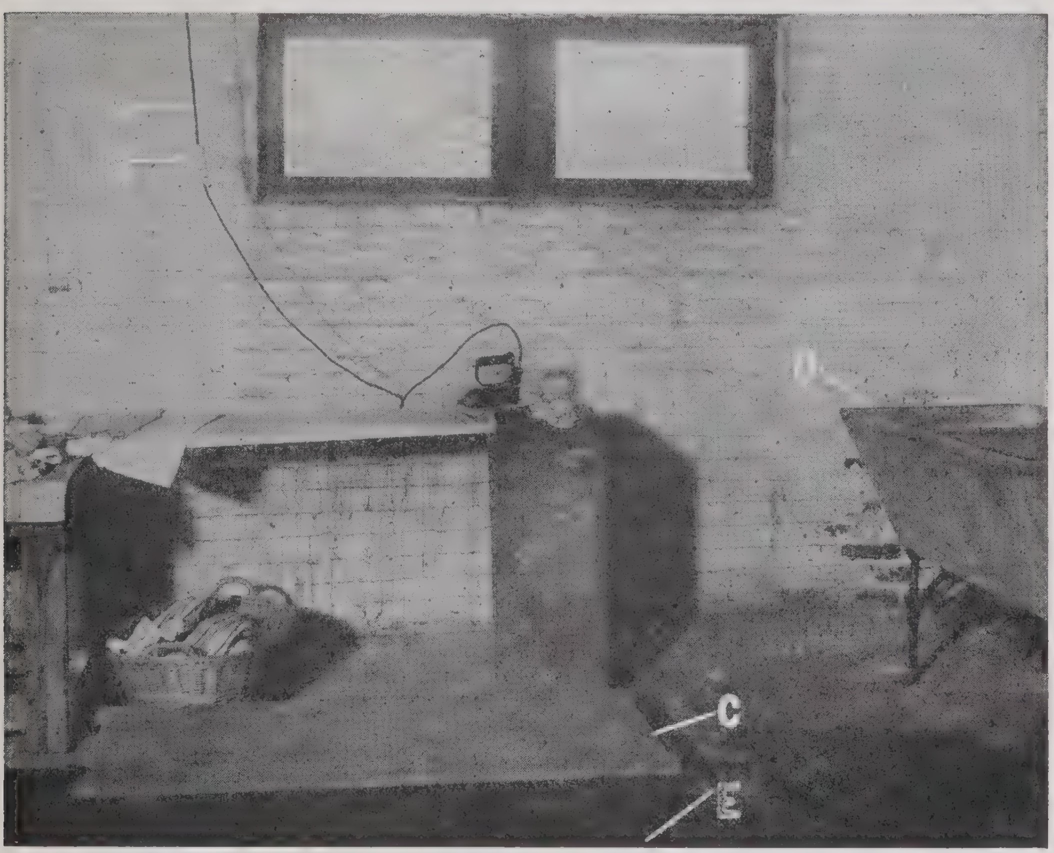


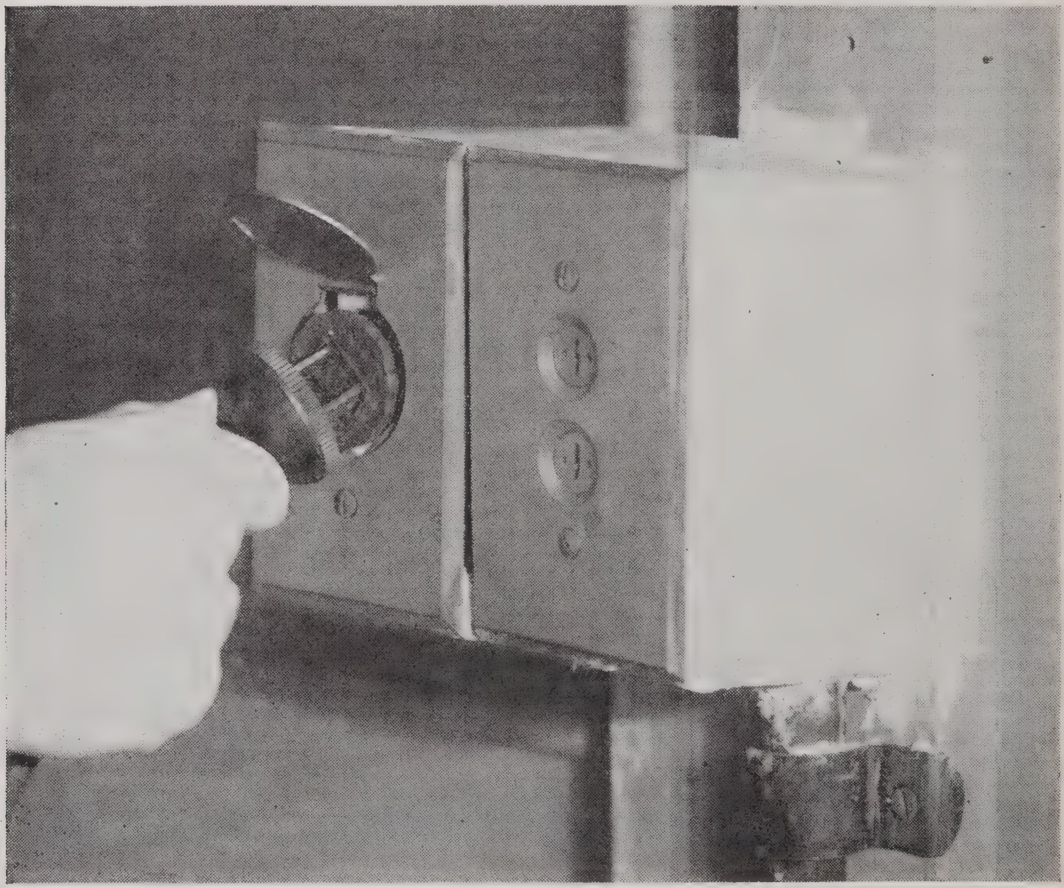
Fig. 93.—A properly equipped and adequately protected arrangement.

The porcelain socket B with its reinforced cord A, the dry wooden platform C, and the distance of the worker from the grounded laundry tubs D, all contribute to safety. Note the protection afforded by the wooden platform from the wet concrete floor E.

Clothes Driers.—For outdoor work the driers vary from the hemp clothes-line, taken down after each drying, or copper wires, stretched taut and left out permanently, to revolving driers mounted either on a post in the yard or on a projecting arm from a porch or window (Fig. 95).

Indoor driers vary from the clothes-horse to a rack which is lifted by pulley to the ceiling (Fig. 96). This latter type is very convenient for limited spaces.

Where one is entirely dependent on indoor drying, driers may be built in. A small room with a window can be quickly transformed into an indoor drier. The window allows fresh air to circulate about the clothes, and a small electric fan creates a current. If steam pipes or a small heater is placed in the room, the conditions are good. If one is planning to use a closet that has no windows, the walls could be protected by corrugated galvanized iron to create an air space which acts as a fire precaution. Such a closet could be easily arranged for a school dry-room if the laundry department had not been planned when the school was built.



Courtesy of Good Housekeeping Institute.

FIG. 94.—A fuse box that is impossible to "blow out."

Home driers are made with the stove attached (Fig. 97), and are connected with a flue outlet so the moisture is quite free to escape. Without this ventilation clothes are likely to yellow (p. 278).

Curtain Stretchers.—These are of great use in finishing long lace curtains or in shaping blankets. They are not expensive, therefore choose the best. The frame should be very substantial to prevent warping; an easel is a great convenience as it means that the stretcher may be placed out of the way. The pins may be movable with the idea of fitting all scallops, but the stationary pins are more substantial and very satisfactory. For straight edges to be pinned, one may baste to the edges of the curtain a piece of tape, and the pinning be done on this. Some prefer to tack tape, ticking, or unbleached muslin to heavy strips of wood which can be clamped together and then pin to these instead of using the frame. This latter frame can easily be made in the home. Clamps may be bought at a hardware-supply store.

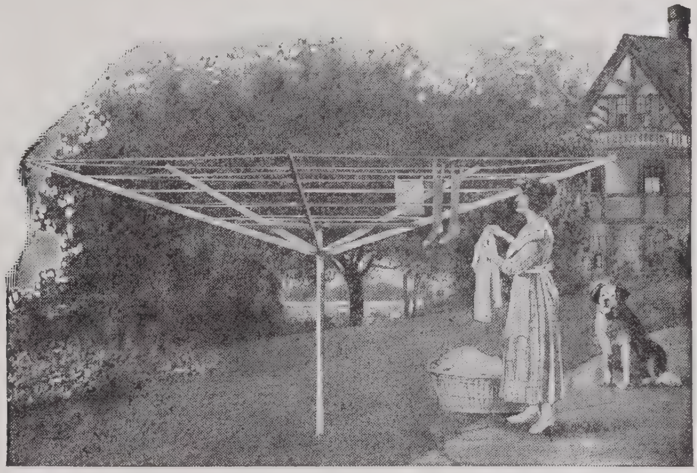


FIG. 95.—Revolving clothes drier. Closes umbrella fashion when not in use.

Clothes Pins.—Clothes pins should be of the best quality and should be kept very clean by being stored in a bag. A bag made like an apron is most convenient, as the pins are right at hand. Make the pockets broad rather than deep.

Clothes Sprinklers.—Saving of time and effort has made us lay aside the use of the hand as a sprinkler for a method which is quicker and with most workers gives better results. There are various kinds of sprinklers: a whisk-broom set aside for the purpose; a sprayer that may be used in almost any pint bottle; a zinc can with a handle at one side, and a finely perforated top; a rubber bulb sprayer like that used for spraying plants; and a fine mist sprayer attached to a hose. These are all efficient, but the most suitable is one easily dried, with fine holes, and not too expensive (p. 63).

Flat-work Ironers.—Ironers, formerly called mangles, are time and labor savers to the person who irons as the washing machine is to one who washes (Fig. 98). Whether small or large, ironers have some general points that should be considered before one purchases. The small home ironers are heated by gas or electricity. The heat of the ironer should make the metal shoe as hot as any flat-iron, for it must do the same work in less time. The test is the same, *i.e.*, getting the hiss or spat sound on applying the moistened finger. When the gas ironer is installed, it is wise to plan a larger gas pipe than is usually used, for the gas flow must be generous, not only to heat the ironer but to resist the constant chilling caused by the inserting of the damp fabric and the rapid passing of the garment. Electric ironers give the greatest service and saving when they are

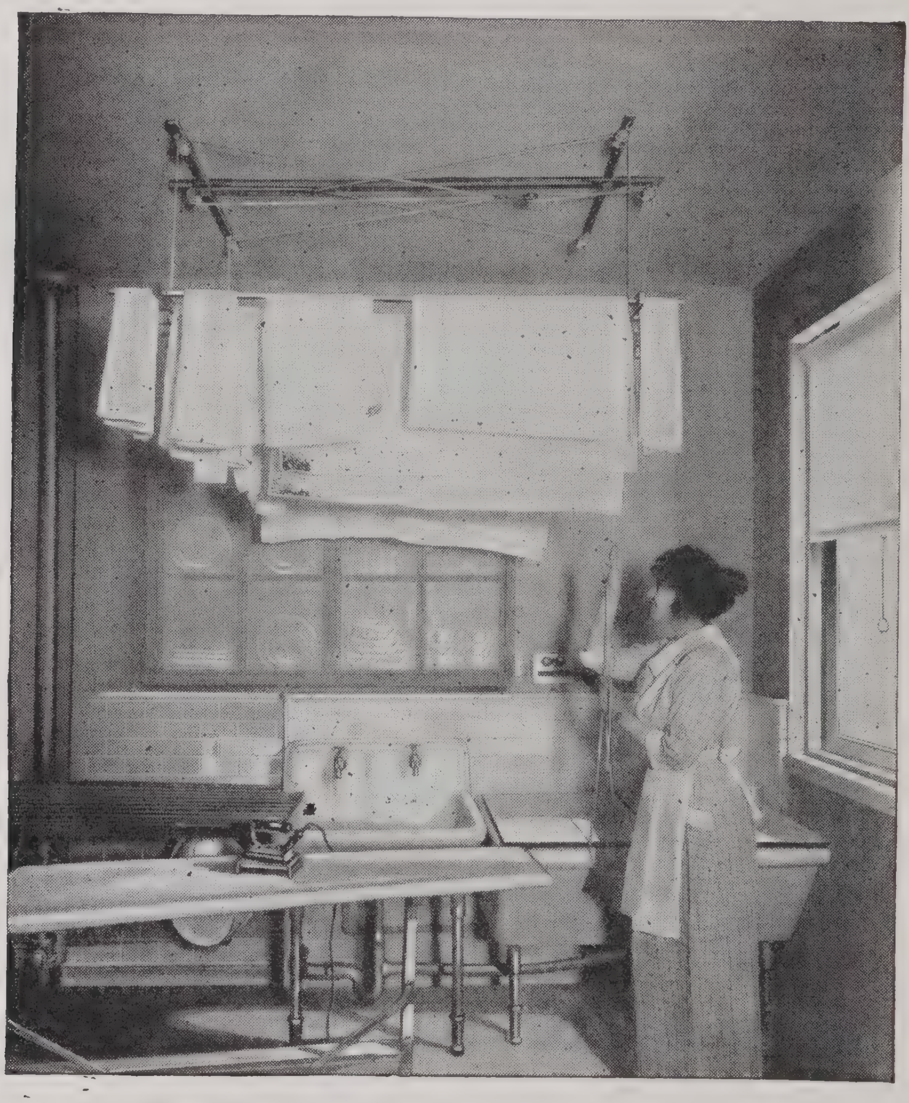


Fig. 96.—Ceiling drier, which lifts the clothes up out of the way.

wired to heat by two switches. One switch turns heat into one-half the ironer, and the second heats the second half of the whole length. Small pieces, like napkins, doilies and handkerchiefs, can be done with half the electric cost by heating only one-half of the ironer. This is a saving if only one worker does the ironing. If two people can iron at the same time, then of course it is better economy to use the whole ironer. Some ironers have three speeds, which add greatly to the power of production (p. 284).

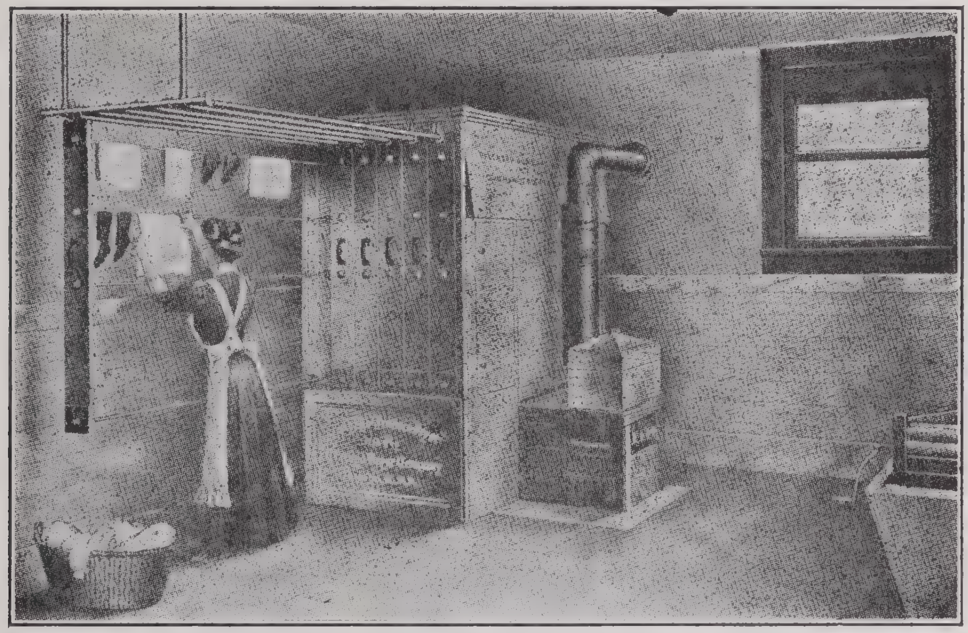


Fig. 97.—Combined drier and laundry stove.

The *cold mangle* (Fig. 99) is an old device for pressing out the creases from dampened clothes without giving any gloss, and without any of the sterilization which comes with the usual hot ironing. The principle is like that of a wringer, with rolls of hard wood, and springs at each side, which control the pressure. The mangle may be clamped to any table by the use of a thumb screw. More expensive ones will be found with their own table. The clothes are slightly dampened, all hems and selvages well stretched, and the garment rolled as for ironing. Instead of being ironed, a folded tablecloth or sheet is put through the mangle. By repeating the process, each time folding to increase the thickness, the work is made complete. As there is no heat, the pieces must be hung up to dry after pressing. The initial cost covers a large range, depending upon the size, upon whether the mangle consists solely of the rolls which are to be attached to the table or whether a table is its base, also upon the efficiency of the spring, which determines the pressure.

Home or small-power ironers are to be refelted like the large ones (p. 93). The strain being less on these ironers, it is not necessary to glue the edges of either felt or muslin. Cut the muslin long enough to allow for shrinking and for turning in over the edge of the felt.

Ironing Boards, Tables, and Sleeve Boards.—The ironing surface should be very firm and large enough to allow a large space to be ironed at one time, and also to support the garment while it is being ironed. Sleeve boards should be mounted on their own bases, and have a small, narrow end and a large end. Tables are especially useful for large, flat pieces and for drying sweaters and laces, while the skirt board is a necessity for easy dress and skirt ironing. These same tables may be used for sprinkling and starching by being covered with a piece of enamel cloth. The skirt board may be stretched from table to chair, but it will be found more convenient to have it on its own standard fastened to the floor (Fig. 100); or with one end hinged to a wall, to be ready for use or quickly folded up against the wall when not in use, solving the problem of storage in small rooms. It must be remembered that if this board is hinged to the wall under a window, it will close off the window when lifted up out of the way.

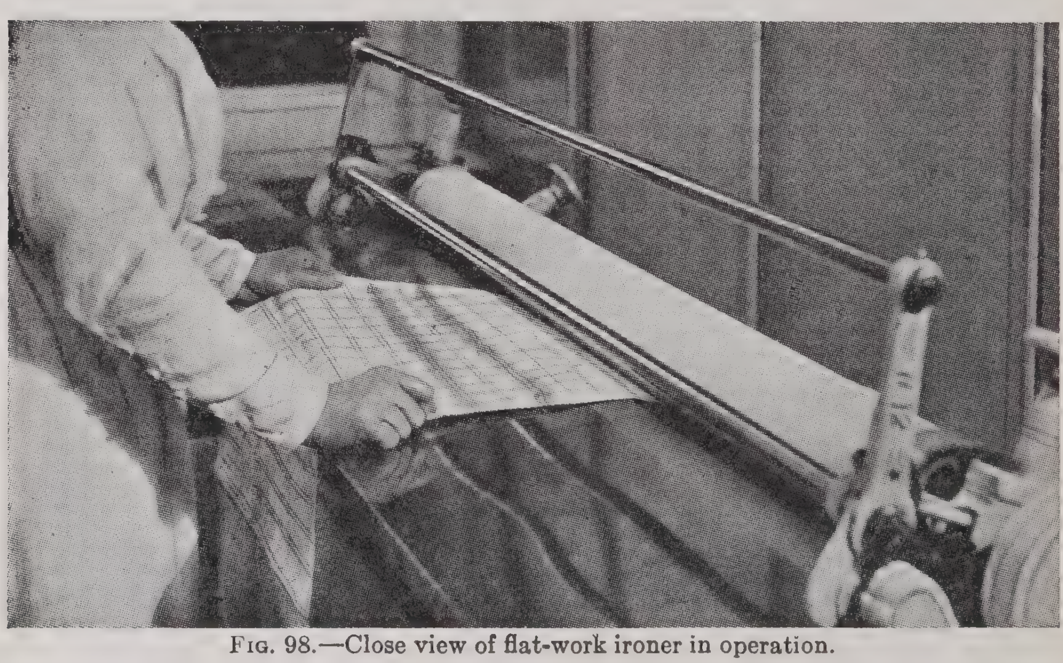


Fig. 98.—Close view of flat-work ironer in operation.

A stationary iron standard with board, electric iron or gas stove, and two water pans may be bought. These are most convenient and have been most efficiently arranged, for they are used by the commercial and institutional laundries where efficiency must be considered.

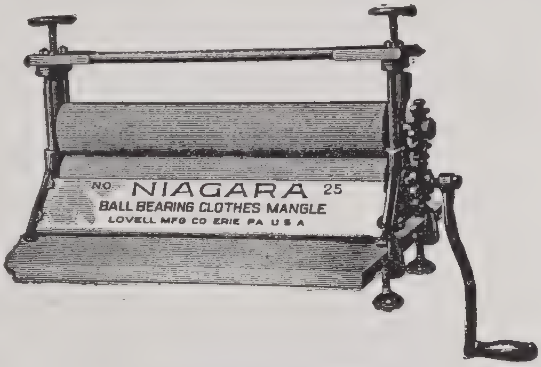


Fig. 99.—Cold mangle.

To fasten the ironing pads and covers, thumb tacks may be used, or the pads may be tacked on and the muslin covers tied or snapped on. To buy muslin for covers, choose a heavy unbleached fabric which is sixty inches wide; then the width of the muslin may be used as the length of the cover. This does away with waste lengths, so is no more expensive, though it at first appears so. Cut the muslin wide enough to have the cover turn about two inches under all sides of the boards. Hem all sides with a half-inch hem, and sew tapes, five or six to a side. The tapes will make the placing or removing of covers a matter of a few seconds—no noise, no time needed to pull out tacks. Two covers to each board or table will mean time saving, and a clean cover always ready. It is a saving to the covers to protect them with a square or rectangular asbestos pad under the iron stand.

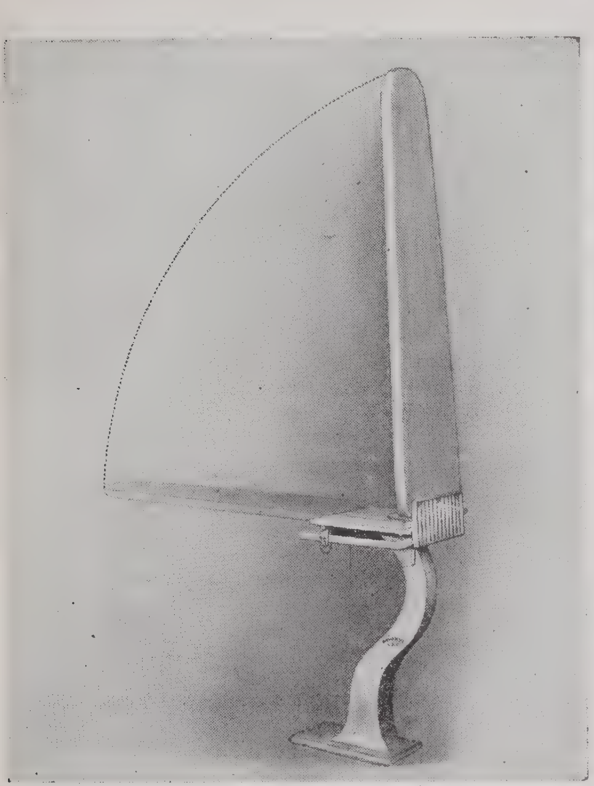


Fig. 100.—Folding skirt ironing board with stationary standard fastened to the floor with screws.

Irons.—Irons, no matter what their heating appliance, should first be considered for their weight and for their shape (Fig. 101). The worker with the old-fashioned flat-iron should have three irons ready for use. The weight of any of these three flat-irons must be, after all, more or less to the worker's liking. Three in all is rather a limited number for one who does varied work, and especially for one who is to do fine lingerie. She will find that besides her three—varying in weight from five to eight pounds—she needs a small iron with a decided point for little ruffles and for narrow edgings, such as might be found on baby clothes, or fine waists or gowns. For perfect sleeve work she will like the long, narrow sleeve-iron, which noses its way well into the gathers and tucks of the sleeve. Irons with adjustable handles are desired by some ironers, as no cloth holder is required, and the iron is cooler to the hand. These irons are not likely to be as firm, because the constant working of the spring will in time loosen it. Fluting or ruffle irons and plaiting irons are efficient and make many garments most attractive. Plaiting can be done with a knife ("knife plaiting") or with the fingers and the irons. If sad irons are heated on a gas flame, it will be economical to cover them with a regular hood that comes for the purpose or to place a small shield about the irons as one does in back of a chafing dish.

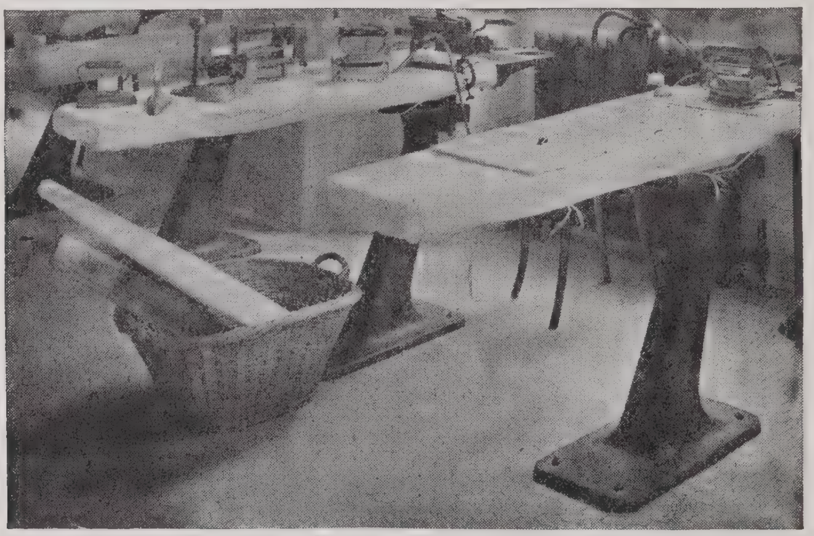


Fig. 101.—Good equipment for ironing.

Electric and gas irons are most helpful in reducing the heat in the summer, besides being economical. They require no hot stove, no walking to and fro to change the iron, and some are of great convenience in traveling.

Electric Irons.—The electric iron is perhaps one of the best irons as an economizer of time and labor (Figs. 102, 103). All electrical appliances such as iron, ironer, or washing machine, must be purchased with a knowledge of voltage and current. The plate mounted at the back of an iron will read, for example, Direct V105-115. (See also p. 222.) An iron of from six to eight pounds is the best for rapid ironing, because, unless an iron be sufficiently large to have considerable heating surface, it will cool with heavy ironing faster than it heats. Various types of attachment plugs may be used (Fig. 104). As a safety device to these irons, it is wise to have a small one-candle-power electric light connected with the attachment plug to show by its light whenever the iron is in use. It is an advantage to have the wire lifted and held by a "bird-cage" spring, which also gives it play as it is used. Keep the wire from knotting or twisting, because the fine individual wires of which the cord is made are as fine as No. 60 spool cotton, and the bending back and forth, which the knotting and twisting produces, causes these wires to break. The conductor of the electric current is not only broken, but often these broken ends come in contact with metal and give a spark, which is a real fire risk. A switch plug near the ironer is best for all irons, as it reduces the chance of making poor connections when attaching and detaching the iron. (See Figs. 105, 106.) Sometimes a plug may burn out because the connection is not well made or because the plug is already carrying its full capacity of power in lights, and the additional demand is too great. Breaks in the insulating covering of the cord may be mended with tape like surgeon's plaster or the special tape used for bicycle tires; or best with electric insulating tape, which may be purchased at any electric-supply store. Some such first-aid equipment should be kept on hand, for safety demands that such breaks be repaired at once.

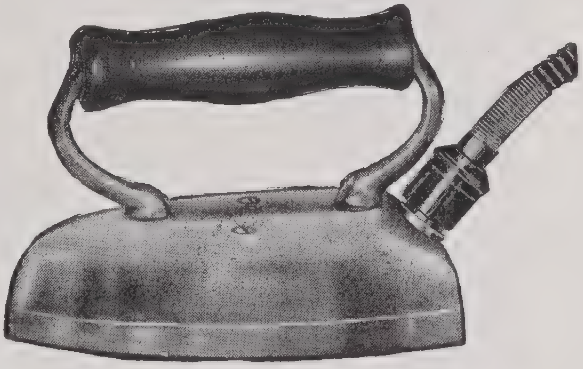
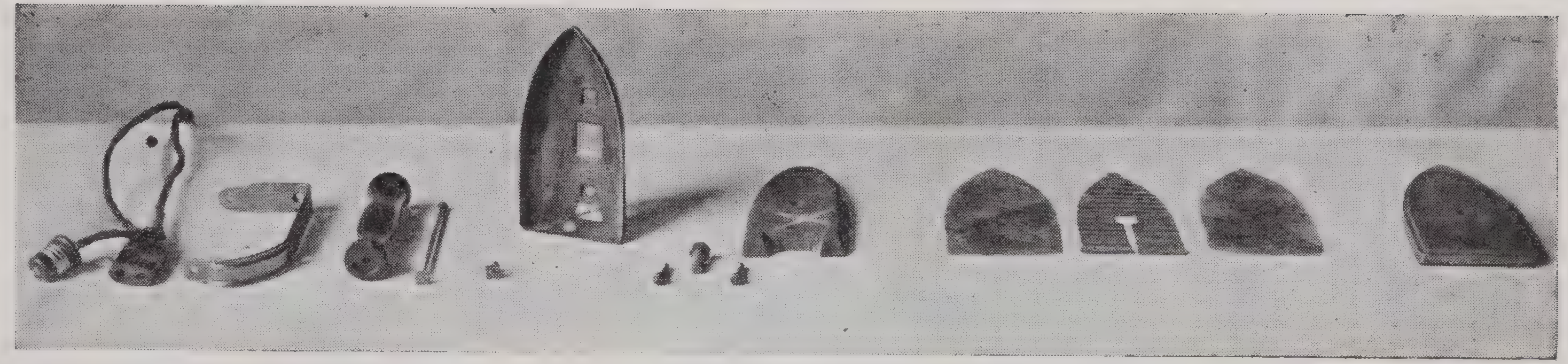


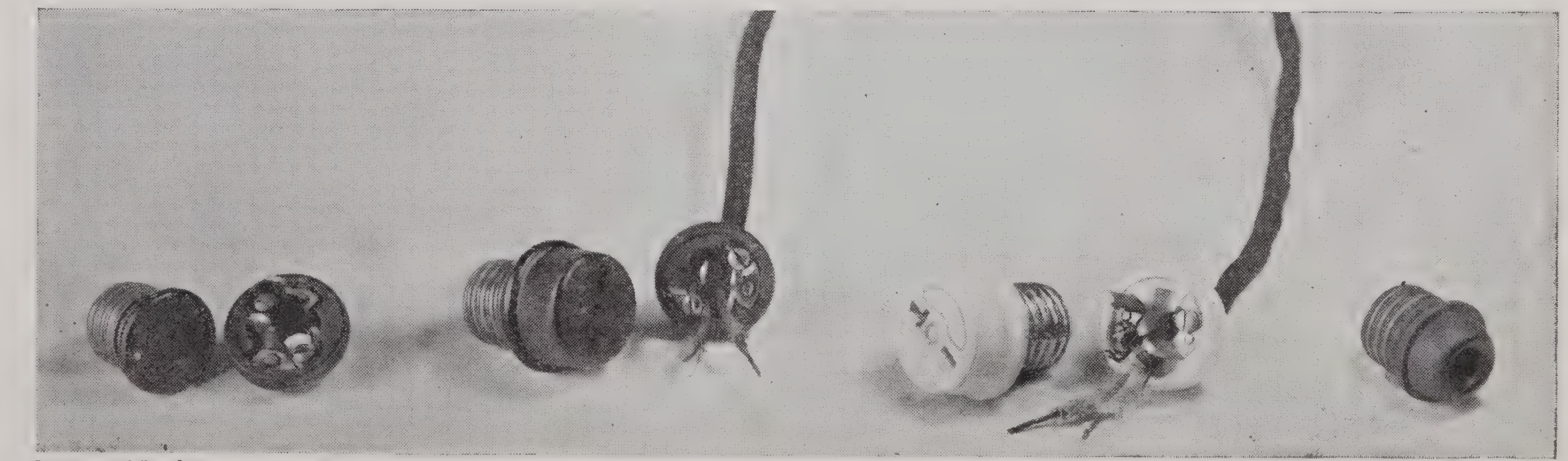
Fig. 102.—Electric iron.

Gas Irons are like small stoves with gas burning in them (Fig. 107). Great care must be used to keep the tubes in perfect condition so there is no chance of leakage of gas, or of fire. Be sure the rubber hose conducting the gas is flexible and of good rubber, preferably wound with wire to prevent its knotting or twisting (Fig. 108). Such an iron must burn with a blue flame, to keep it from forming soot.



Courtesy of Good Housekeeping Institute.

FIG. 103.—An electric iron separated into its parts.

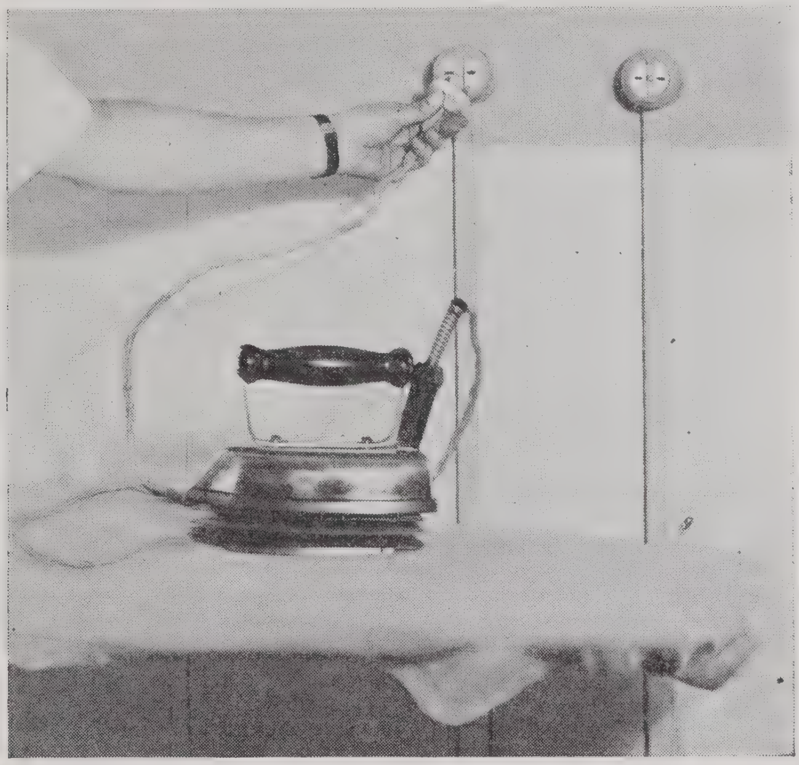


Courtesy of Good Housekeeping Institute.

FIG. 104.—Various types of attachment plugs.

With either gas, gasoline, kerosene, or alcohol iron, see that it is so constructed that its flame is always blue and not yellow, which will soot the iron, and that its flame does not flare backwards, as burning backwards may be dangerous. Be very careful of those irons with the fuel tank on their backs.

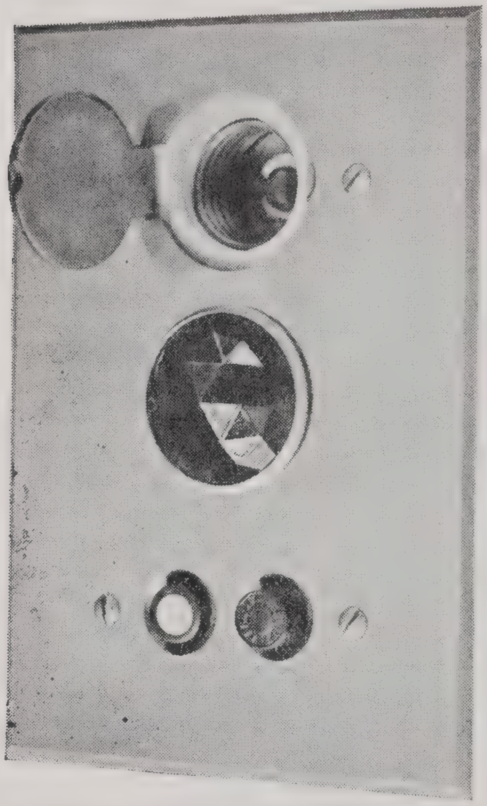
To Choose an Iron.—Weight increases the capacity of the iron to hold heat, and all self-heating irons should be examined for the extent of their heating surface. An iron should heat so evenly that its scorch is even. This can be tested by a folded piece of new cloth or paper. If there are spots that do not scorch, they show uneven heating. A good iron of even heating power and good metal should hold its heat for a reasonable time and not cool quickly on light-weight fabrics. The time required for heating an iron is an essential test, as well as the length of time it holds its heat. Both tests prove the economy of one iron over another.



Courtesy of Good Housekeeping Institute.

Fig. 105.—Illustration showing correct way of connecting the electric iron.

Care of Irons.—Clean irons are necessary for good results. To clean, wash the common flat irons like a pan, and rub with sand soap, one of the fine abrasive cleaners, ashes, or salt. Emery paper will polish a rough surface. Then wash with hot, soapy water, rinse in hot water, wipe dry, and when dry, warm and cover with a thin coating of wax. To clean the self-heating irons, warm them by burning their own fuel, rub with wax and then rub in salt, a fine abrasive cleaner, or on emery paper. Wipe with a cloth, wax, and rub clean. The self-heating irons, especially the electric ones, are not washed. Those with fuel pipes and small holes must be kept free from cleaning powders.



Courtesy of Good Housekeeping Institute.

Fig. 106.—A safety outlet that prevents accidents.

Iron Holders.—Iron holders, made of ticking and asbestos, may be bought for a small sum, but many prefer to make their own, which can be done with no expense other than the woman's time. Folded stockings covered with denim or with ticking make excellent holders, as the stockings are good non-conductors of heat. Two holders will make ironing easier, as a change from a hot to a cold holder is restful to the hand. Holders can easily be made from the small pieces of felting left from covering an ironer; the waste can also be reduced by using the worn felts which are too small for anything else. Plan to have the material that comes in direct contact with the palm of the hand as comfortable as possible.

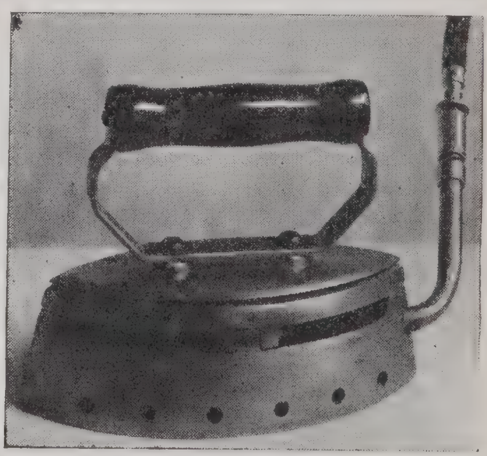


Fig. 107.—Gas iron.

Clothes Hampers and Baskets.—The usual distinction between these two is that the basket is used in the laundry and the hamper as a soiled clothes container holding the linen that is waiting to be washed (Fig. 110). The hampers may be woven baskets like those used most in homes,

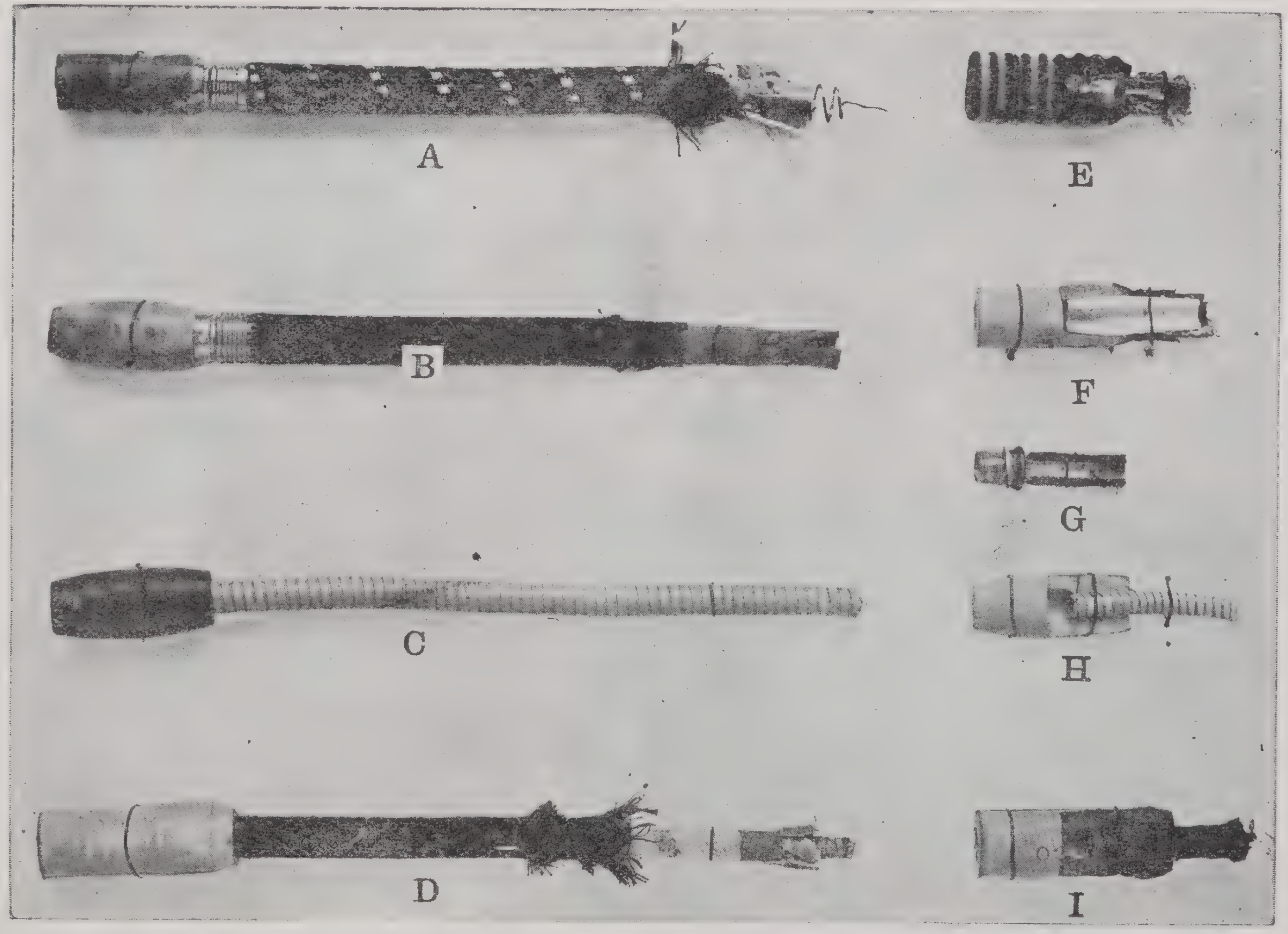


Fig. 108.—Various types of flexible tubing and tubing ends. A.—Wire spiral covered with paper and cotton braiding—dangerous. B.—Cotton fabric impregnated with rubber, gas-tight, but poor for high temperatures. C.—Metallic tubing with rubber thread packing—deteriorates and allows leakage. D.—Gas-tight metal core with several covering layers—durable. E.—End-piece—metal tail-piece screwed into tubing. F.—Wood tail-piece glued into tubing. G.—All-metal end-piece screwed into tubing. H.—Rubber end-piece glued over tubing. I.—Metal tail-piece screwed into tubing and held in end-piece by corrugations.

or they may be metal cans as used in hospitals, or may be papier-maché, white enamel painted. The latter two have much in their favor, as they can be washed with soap and water, hot rinsed, and wiped dry. They will be renewed by a coat or two of enamel paint. Again, they are smooth and afford less chance for the collection of dirt and hence germs. Bags for collecting and holding soiled linen are good, provided they can be washed. They should be sent each week to the laundry as the soiled clothes are sent. Wicker hampers and baskets should have muslin bag linings, which can be washed. Have two, so that while one is drying, a second one may be slipped in. (See p. 197.)

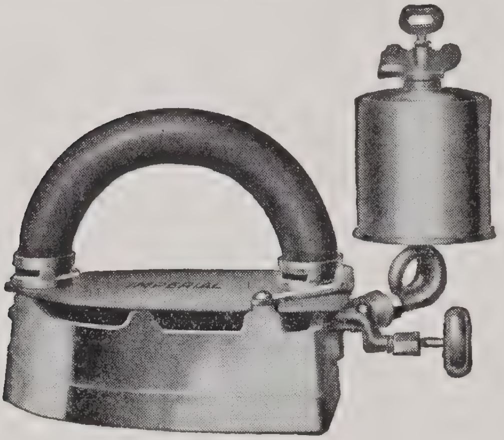


Fig. 109.—Self-heating iron, burning gasoline or kerosene.

Fire Extinguishers.—It is very essential that every laundry have some means of checking fires before they get beyond control. The simplest extinguishers are a pail of water and a fire blanket. Both of these are limited in their usefulness, but are better than nothing.

The fire blanket is especially good for smothering a fire, as when a person's clothes are afire. A blanket shuts off the air from the fire, and literally chokes it.

Water may be all right in some cases, but not all. It is worse than useless for an oil fire, for it spreads the oil and with it the flames. Besides, there is a temptation to use the water for other purposes, thus leaving the bucket empty perhaps at the very time it is needed most.

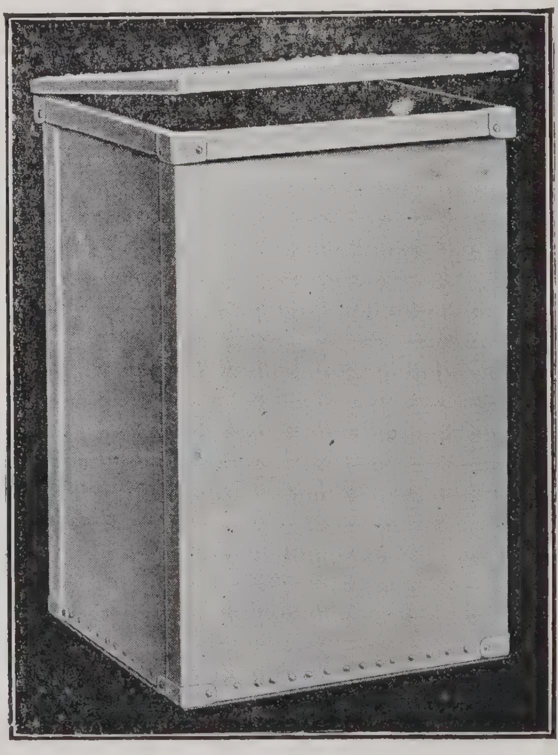
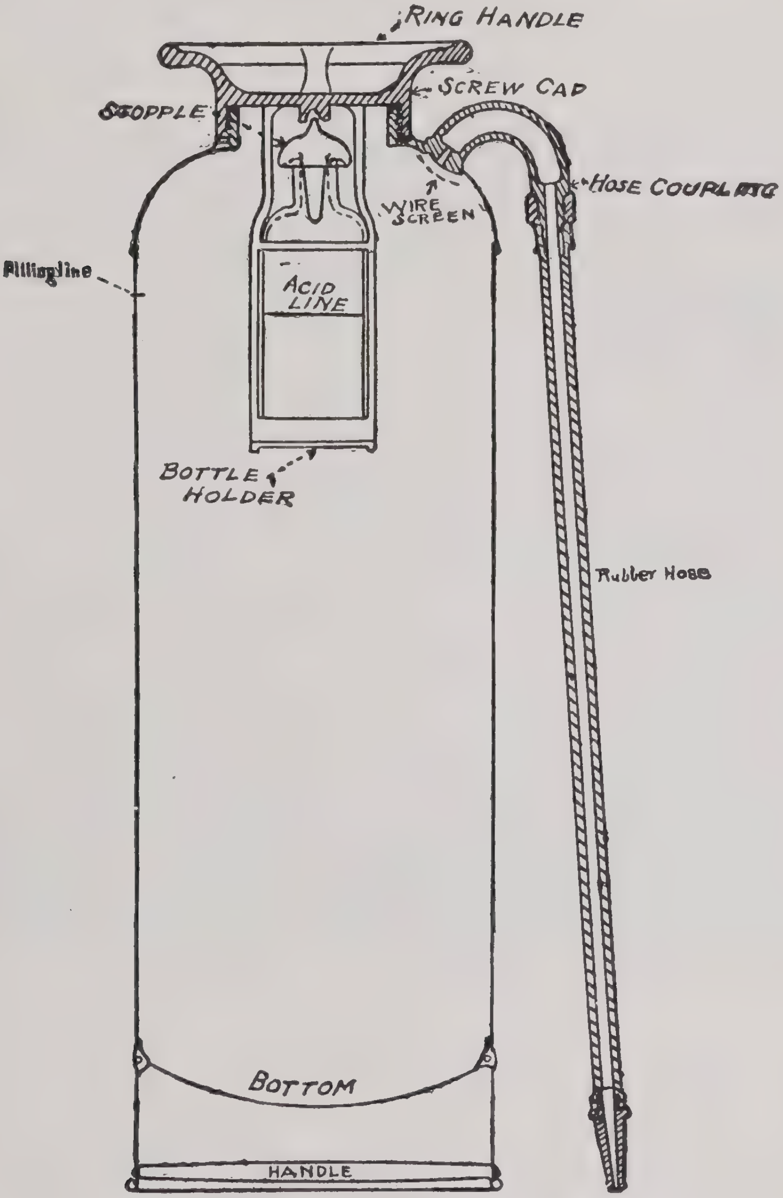


Fig. 110.—Clothes hamper.

Chemical fire extinguishers are the most efficient because they are so constructed as to be easily directed at the particular point necessary. They are never used for other purposes, and are thus always ready for service. One type of extinguisher is a "soda-acid" agent, which is really a carbon-dioxide extinguisher (Fig. 111). When the container is inverted, the sulphuric acid flows into the soda solution, liberating carbon dioxide with sufficient pressure to force the gas and water through the hose and against the flame. Carbon-tetrachloride extinguishers are not only very



. 111.—Sectional view of a soda-acid fire extinguisher.

effective, but light and as easy to use as a piston pump. Such an extinguisher is especially good for fire from burning grease, gasoline, or an electrical fire. The piston pump forces the carbon tetrachloride into the fire, and a heavy incombustible vapor is formed which smothers the fire.

Whatever type of extinguisher is used, it is wise to remember that the smothering chemical should be directed at the *base* of the flame, not scattered wildly in the air (Fig. 112).

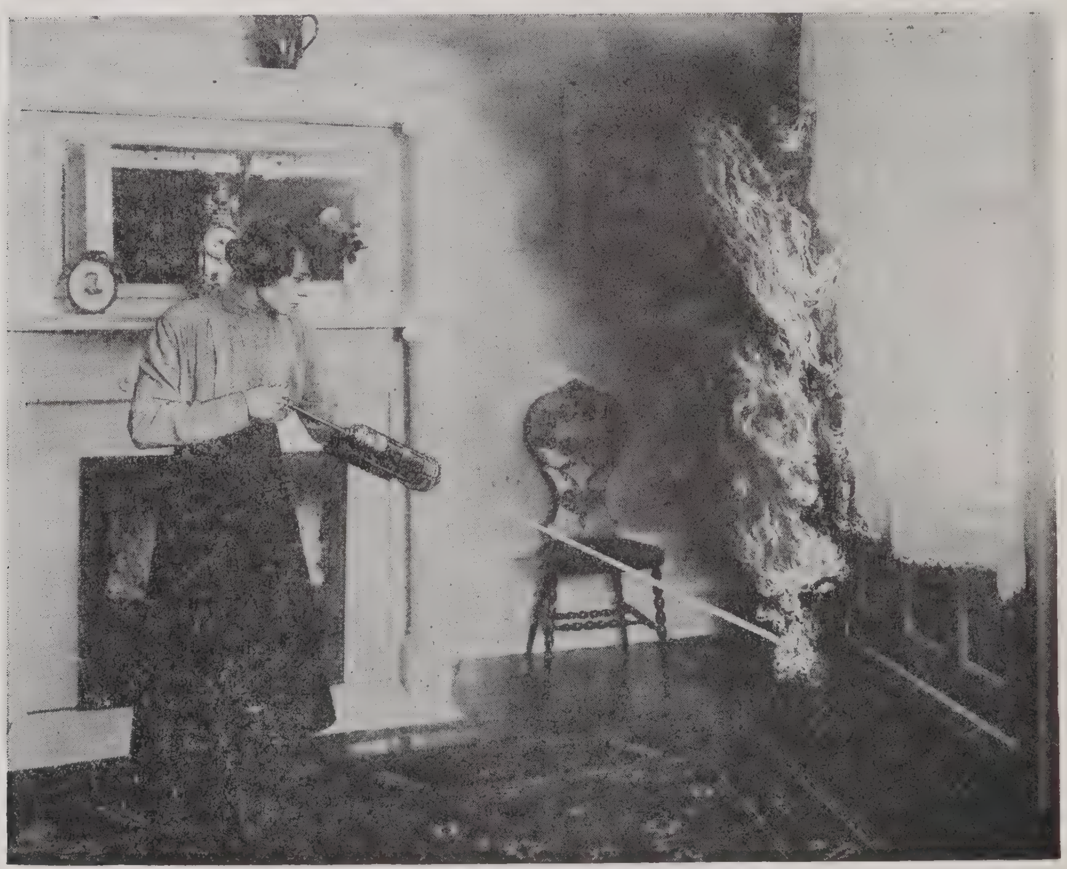


FIG. 112.—The right way to use a fire extinguisher.

* * * * *

Everyone knows the great difficulty in cooking without saucepans and bowls and cups. In spite of this, too often the kitchen is well equipped, but there has been no thought that the same needs may be present in the laundry. The housewife has failed to realize that there is anything to laundry work except hard drudgery. Invariably the student remarks, " Why, I did not know laundry work could be so interesting, in fact, fascinating. It is so easy with the right tools."

Questions

1. Under what conditions do you feel it justifiable to combine a laundry with a kitchen?
2. What reasons have you given for your choice of a washing machine?
3. Given a kitchen floor in an old house, how would you finish it to make a practical and sanitary laundry floor?
4. What safety precautions have you formulated as rules to be followed by the worker in your laundry?
5. What special care would you exercise in putting your equipment away after the day's work?
6. Problem: State the labor-saving appliances you would buy if you had $200 to spend. Draw a plan of your laundry room, and as it is now shaped arrange and set up the new equipment you have bought with this $200.

CHAPTER XXI

THE INSTITUTION LAUNDRY

ESTABLISHMENT OF THE PLANT

When one is contemplating a new building for a hospital, a school, or other institution, a great many factors must be considered; the amount of money available must be balanced against the value of land, costs of construction, equipment, etc. While we are considering here only one part of an institution—the laundry—yet this part is dependent upon and largely controlled by the decisions concerning the whole plant.

Location.—The money and the size of the lot will determine whether the laundry is to occupy a part of the main building or a separate building. If it is to be housed within the building, then we must consider well its location in relation to the rest of the plant. In small institutions it is not a bad plan to build the laundry and the kitchen in close relationship, in order that one supervisor may handle both departments. This reduces the expense of supervision, while at the same time it insures a certain amount of trained supervision for both departments. The laundry should be in no way a part of the kitchen, but may be in close conjunction, as a wing from it. The main advantages in this arrangement are no elevators either for work or for employees, good access to the drying yard, and ease in delivery of supplies. Sometimes, in such a close union of laundry and kitchen there is an attempt to reduce expense by shifting workers from one department to the other; for instance, sending a waitress into the laundry, or a laundry worker into the dining room at noon-time. This is apt to react badly on the efficiency of both departments, because every worker needs some rest time. It would be better to have the waitresses act as chambermaids, and let the laundry workers stay in their own department.

The Basement.—Too often the laundry is put into the basement of a building, without previous consideration as to whether it is dry and as to whether there will be plenty of light and air. In some hotels where ground space is at a premium three or four sub-basements may be found, in one of which will be the laundry department. It is very necessary, in planning a laundry in a basement, to make sure that there is a possibility of forcing in cold, clean air and sucking out hot air and steam.

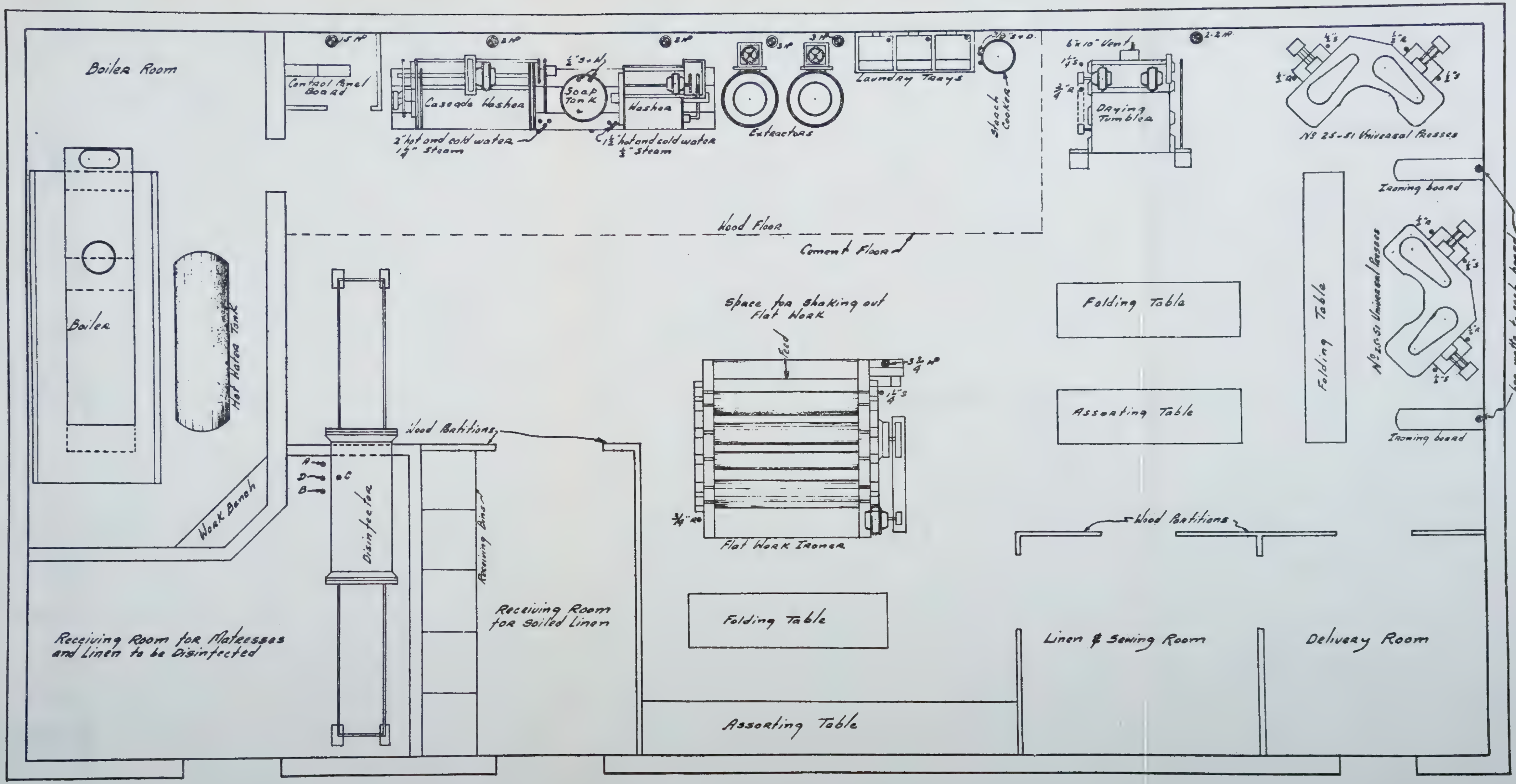
The Roof.—Some modern architects consider the practicability of using the roof for the laundry department. The heavy equipment used would necessitate special strengthening of floors and beams, and a large elevator to carry the hampers of clothes, but there are many points in favor of such a location. The laundry can be made so that it is entirely shut off from the rest of the building by a fire door. With such protection the entire laundry might be burned without any special damage to the rest of the plant. This is a point much considered in hotels, but not always considered possible in an institution. A laundry situated on the roof makes possible good light and good air, with no permeating through the building of odors from steam or ironing; the vibration is little because the whole building has to be constructed to deaden vibrations.

A Separate Building.—Of course, a building by itself is the very best. It may be constructed to suit its purpose, not necessarily in accordance with the architecture of the main building. The best construction material is cement, because it is as nearly fire-proof as is possible, and is easily cleaned. It can be moulded so that there are no corners and angles for dirt, and no runways for vermin. A cement building may carry less fire insurance than a frame building, which is, in the long run, an economy. It can have plenty of windows, insuring both light and air. Indeed, there need be only enough wall space to accommodate the machinery, and to insure the strength of the building. Usually, also, such isolation results in direct and individual supervision. The expense of a separate building may be reduced by housing the service dormitory and the laundry under one roof. The hours do not interfere, nor should the noise and vibration of the machinery in any way disturb the rest hours of the workers. If there are two distinct entrances, it will mean that employees have no access to the laundry out-of-hours. The building may receive electricity direct from the city plant, in which case there will be no need to have an engine for the generation of power. This is one way of cutting down on required space. However, the plant will be more independent if it has its own power.

Size of the Plant.—The size of any laundry can be given only theoretically, but there are a number of points that will help in checking up the amount of space. The laundry of a plant is too often outgrown because, in the first planning, it was made only large enough to meet the current need. When new buildings are added, there is no space on the laundry floor for the extra machinery necessary to care for the additional work. The laundry work of a hospital may have to be expanded with the kitchen work remaining the same. Too often this is the case when some special extra work—as from an explosion, a fire, or some other town calamity—brings its strain on the laundry. Be sure, therefore, to plan the floor space large enough to meet emergencies and to allow for growth. There is a thrifty statement which says that no machine should be idle in a laundry. This is true; but do not let the statement be interpreted to mean that the new machine must work at full capacity at the beginning. Plenty of space is necessary for air and ventilation. No room should be so full of workers and machines as to cramp the work. Such a condition is irritating to all the workers and produces unnecessary fatigue. Let the passageway for trucks and baskets be wide, so that no worker needs to knock against a machine.

Routing.—Of course, even with space there will be confusion if the work is not well routed. It is most essential to route and to group the work in order that no extra hauling or waste of time be necessary (Fig. 113). The machine manufacturer can give all needed information as to size of floor space for each machine and each truck. With this information at hand the supervisor can easily check up the floor space on the builder's blue print, using, to represent each machine, a piece of cardboard cut to scale. This is an important check-up, which will save many regrets and much money later. (See also *Floor Plan*, below.)

Details of Construction.—The details of the construction of the plant are summed up in the general statement that the floors, walls, and ceiling should be impervious to moisture and be easily cleaned. Any finish "impervious to moisture" should be one that could be cleaned with a hose. In order to make such a cleaning effective, the drainage must be direct and complete. The floor must, therefore, be laid with a slight incline toward the drain. This incline need not hinder the worker in walking or in pushing the truck-tub. The drain under the washer must be



Building 40'x30' inside measurements
Ceiling height 12'-0"

FIG. 113.—Floor plan for laundry of a small hospital.

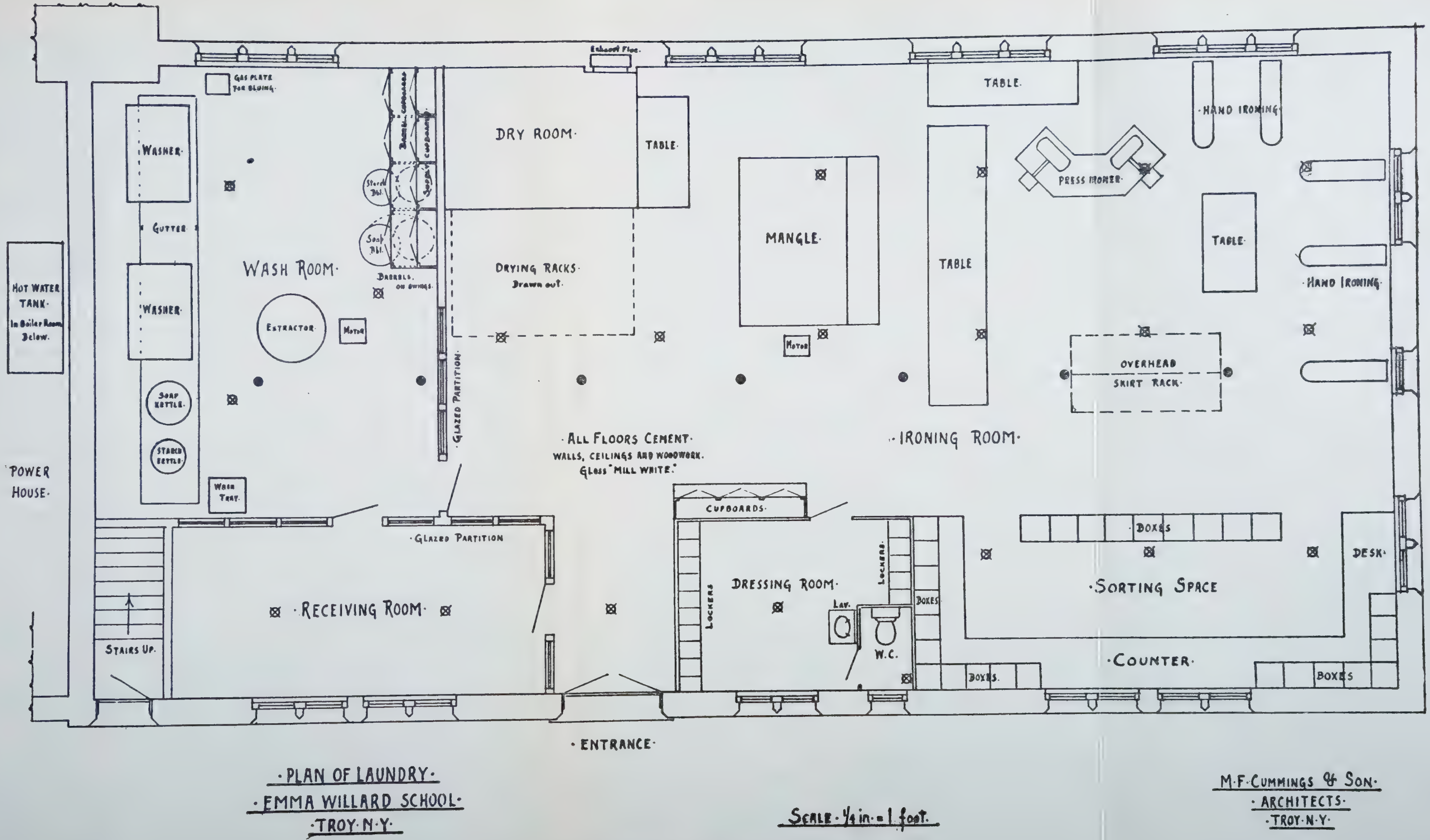


Fig. 114.—Floor plan of dormitory laundry for Emma Willard School, Troy, N. Y.

large enough to hold and deliver all water as it comes from the machine, allowing no overflow onto the floor of the laundry.

Tile or cement *floors* are generally the best. The cement is cheaper and looks better throughout its continual service, but it must be finished so as to be smooth and glazed, to prevent "dusting" from walking. Linoleum, or "spread" tiles are good, but are more suitable for the ironing room than for the wash room of an institution, where they would be easily cut by the heavy trucks. Small tiles are preferable to large ones for several reasons. Small tiles, particularly the octagonal ones, have closer contact with each other than do the large tiles, and are less likely to loosen; the latter, in addition, have such large surfaces, that they are apt to be broken by the trucks. A broken tile is a gathering place for dirt, besides subjecting the trucks to unnecessary jolting, and the workers to risk of falling. (See also Fig. 66.)

The best finish for the *walls,* when tile is too expensive, is glazed brick. White is the best color, for it reflects light well, and makes a good background for shades of stain or soil. The ceilings and wall should be finished in the same way. If glazed brick is too expensive, use a hard, glazed paint on the bricks as a substitute for tile.

The *wood-work,* for which ash is most used, should be comparatively little in amount. The doors and windows are likely to be fire-proof metal and glass. The windows should be large, with little wood between the frames, and the doors are at least four feet wide—double doors are better. There is little space left for wood-work. Use glass or porcelain door knobs, and everywhere as much non-corrosive material as possible.

The *windows* should have large, easily cleaned panes. The transom type of window is very good, both in point of cleaning and of good ventilation. Dust is a big problem in the laundry. The best means of preventing its entrance is by the use of cloth ventilators, which are washable. Fly-screens are a necessity, to keep the clothes clean after ironing. Copper screens give the best service.

Ventilation and good light are both equally essential, and fortunately one works with the other. A laundry that is a building by itself and is in such a place that it is not objectionable to have the roof of a factory type, is most easily ventilated and lighted by using the factory form of roof. Such a roof gives direct light through glass ventilators that are pivoted like a transom. The slanting metal roof eliminates the intense glare and the reflected heat produced by the former type of skylight.

Floor Plan.—A general idea of floor plan is essential. The soiled clothes had better enter at one door, make the round of machines needed for the finish of those garments, and then go out either another door or through the packing room (Fig. 114).

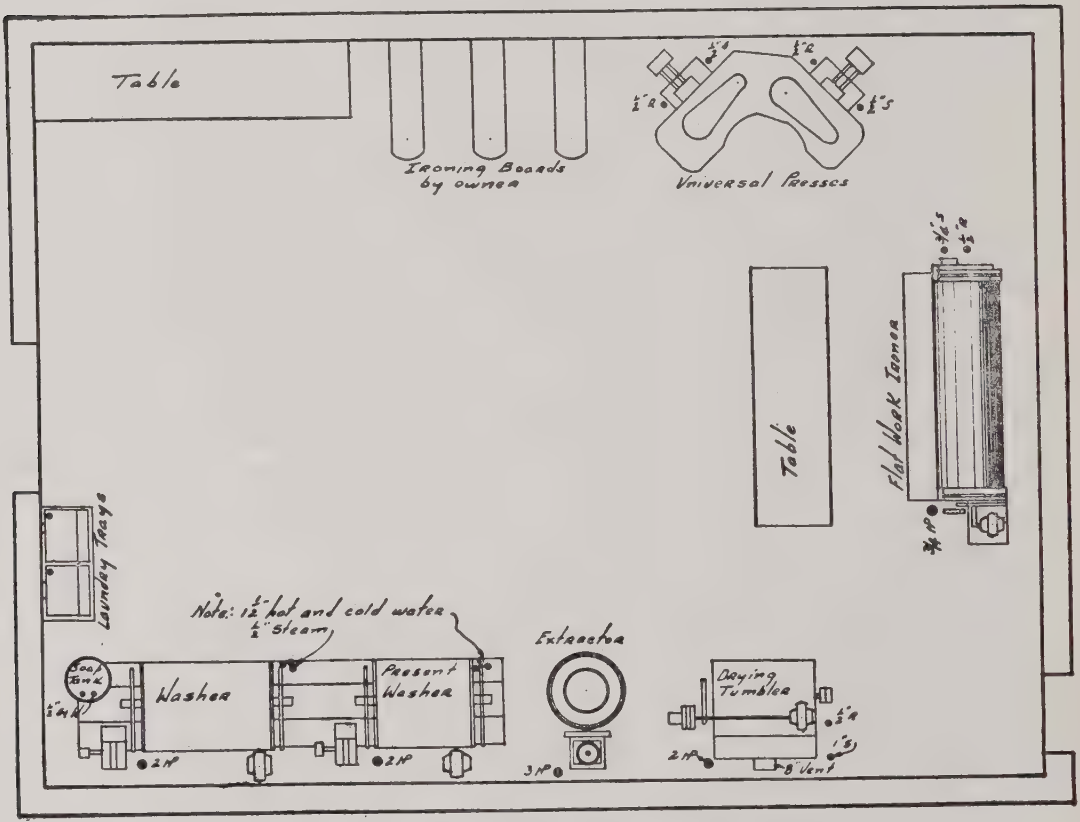


FIG. 115.—Floor plan of small dormitory laundry.

It is possible to divide the laundry into departments without the erection of walls or railings, if the machinery is carefully placed. The work in such a one-floor laundry is very easy to supervise, requiring only one supervisor (Fig. 115). A high building automatically makes each floor a department, necessitating as many supervisors as there are floors.

The *receiving room* should be provided with bins, and be equipped with a marking outfit. This room needs to be of good size as the bundles of soiled clothes occupy more space than the same clothes clean and folded. By good planning of the week's work, this room will rarely be overcrowded.

The *wash room* will be the real starting point for wet clothes. Here should be the machines for washing, the extractor, and the tumbler. Right beside the washer is the soap tank, one to every two washers. Starching may be done in the washing machine and extracted in the starch extractor, this being quite the new way of doing a large quantity of work in a short time. (See pp. 118, 276.) The wash wheels and the extractor should be in close relationship (Figs. 116, 117). Special machines must be established for collar and cuff work, if the quantity is large enough to really warrant doing the work at all. It may be a saving to send this

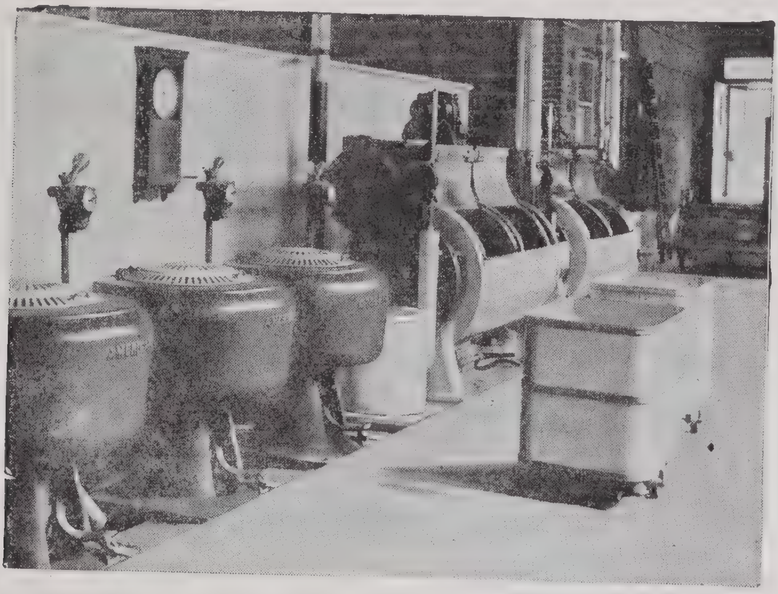


FIG. 116.—Washers and extractors.

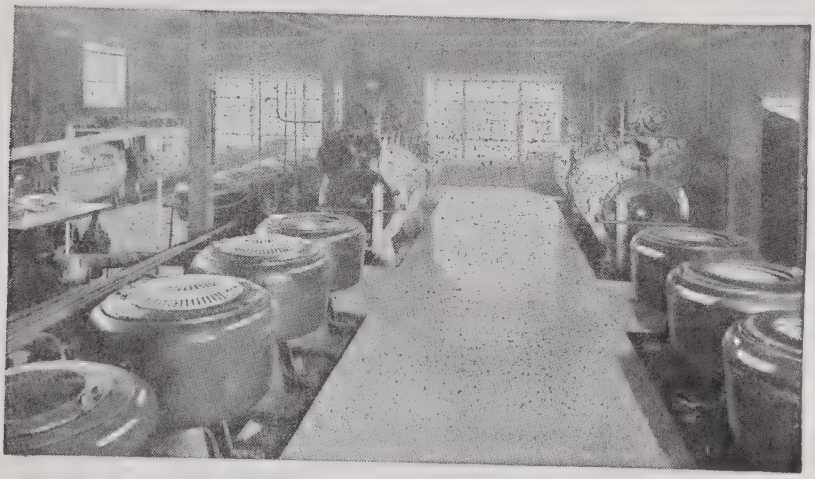


FIG. 117.—Washers and extractors in large plant.

work out if the amount is small, because the cost of machinery and the space required are large. Here the truck tubs need plenty of space to be moved easily, for the load is wet and heavy.

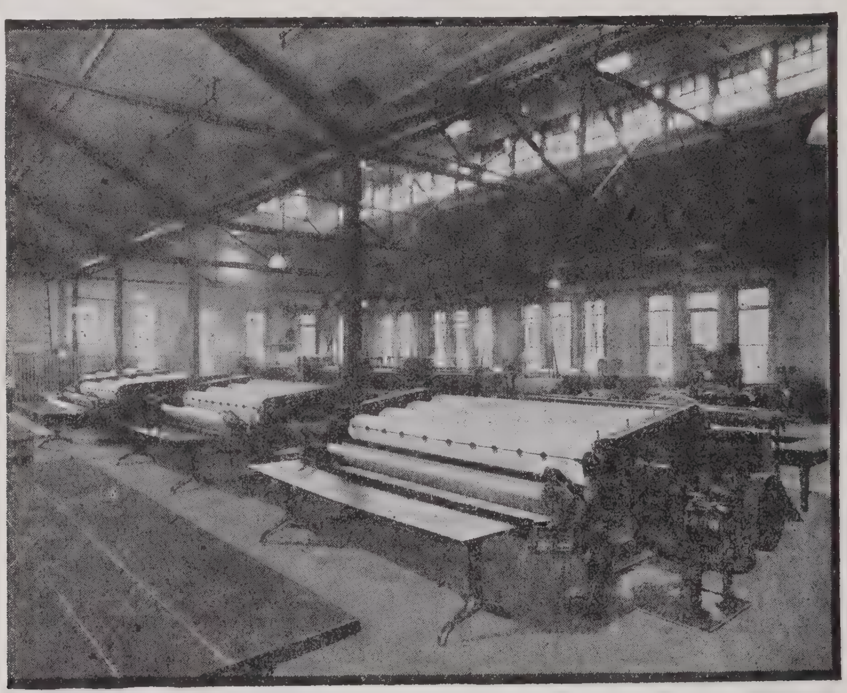


Fig. 118.—Flat work ironers.

At this point the clothes go divergent routes to special machines: the flat work to the large flat-work ironers (Fig. 118), the starch goods to the starch machine and from there to the drier, or, if the work is well planned and the equipment adequate,

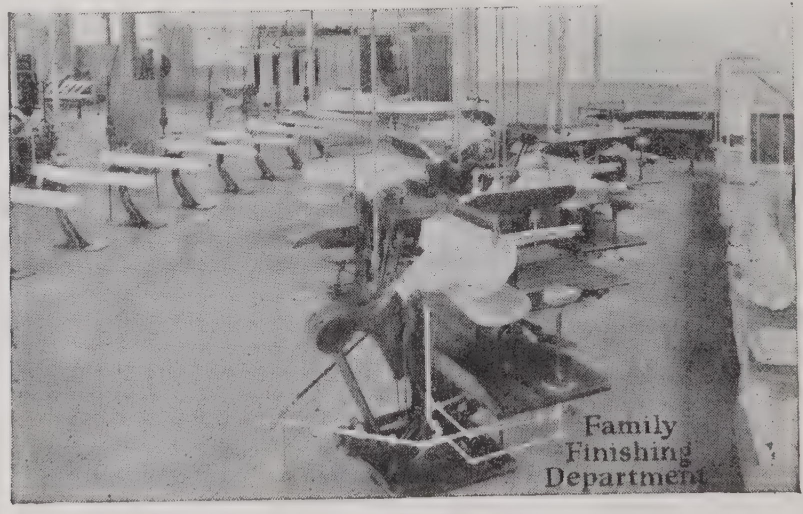


Fig. 119.—Family finishing department.

to the presses (Fig. 119); the flannels, stockings, or eiderdown to the heated tumbler.

The *shipping room* (Fig. 120) should be well equipped with small bins or boxes to facilitate the sorting of the ironed linen for each individual resident. Tables are necessary for bundling and for wrapping, even if the wrapping consists only of putting the linen into clean clothes bags, probably owned by the individual.

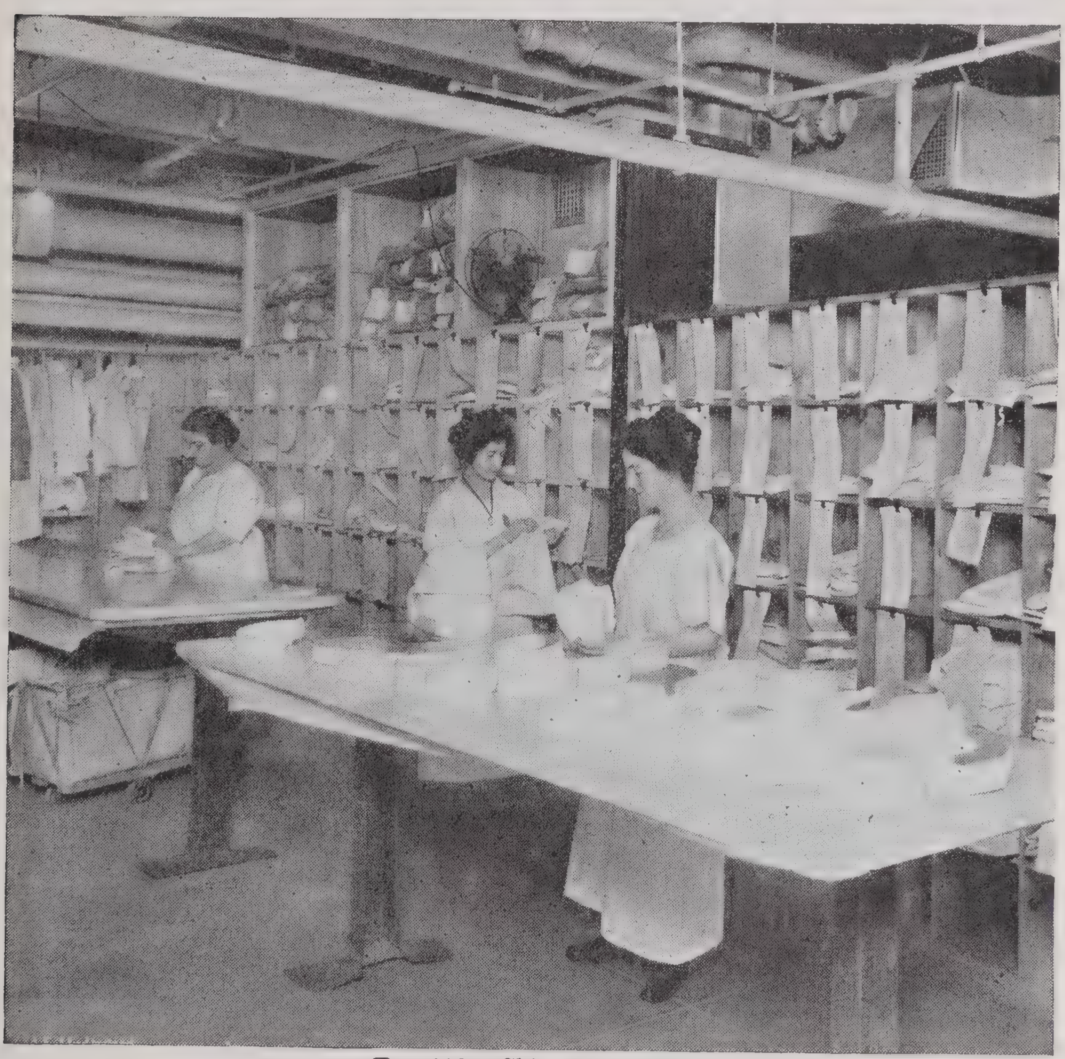


Fig. 120.—Shipping room.

Two other rooms or departments seem really essential: the office and the engineer's room. The *office,* indeed, need be only desk room, so placed as to aid in supervision. But as the business of the laundry involves many owners and much goods, it seems that the files and slips ought to have adequate storage and classification, so as to be readily accessible.

The *engineer's room* should have a lavatory, a small closet for tools, oil and grease cans, and one for such supplies as grease, oil, waste, new belting and small needs like packing and washers for leaks. Such a room is not necessary if the engineer of the whole plant cares for the laundry machines, though a small closet with emergency tools is always necessary. But a room is necessary if, as in many laundries, the head laundry man is a licensed engineer. He will be able not only to care for the machines, but also to act as a wash man. Such a man will give excellent service in the smaller institutions, and is especially good in coöperative and rural plants.

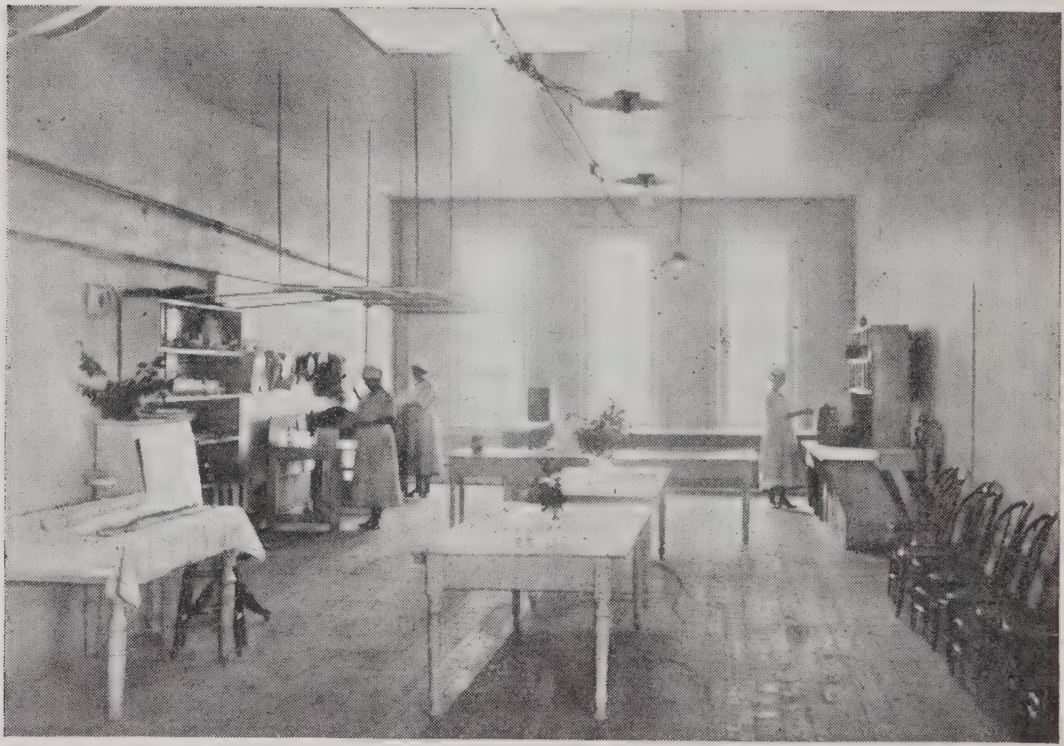


FIG. 121.—Kitchen in welfare department of Dunkirk Laundry, Dunkirk, N. Y.

Two additional rooms, which everyone would like to have, are *welfare rooms* (Figs. 121 and 122), where the workers may have a rest period during the noon hour. The equipment should include a couch, a few easy chairs, additional comfortable chairs, and good toilet facilities. If the plan is properly worked out, a few books and magazines can be provided. Here in connection with the rest room —not a part of it, but closely adjoining—should be provided some simple means of preparing lunch, especially hot drinks. Keep in mind that true welfare work never weakens a plant. It is, on the contrary, a good paying investment. A minimum of such facilities, including dressing and toilet room, is very properly required by the labor laws of the individual states. (See p. 318.)

Machinery.—The amount of machinery will be decided at the time the size of the laundry is discussed. One question is naturally related to the other, and all must be to a great degree settled before the plan of the building, its size, its cost and the work it is to be expected to do, is definitely decided. Be sure that the future growth of the whole plant is taken into consideration, for the laundry building, to be efficient, must be big enough to include all the work of today and all the extra work that may come unexpectedly. The presence of women in the dormitory modifies the laundry in the choice of the equipment necessary to do their type of clothes. The requirements of hospitals or sanatoria are radically different from those of inns and schools. The latter two institutions may not contract for any

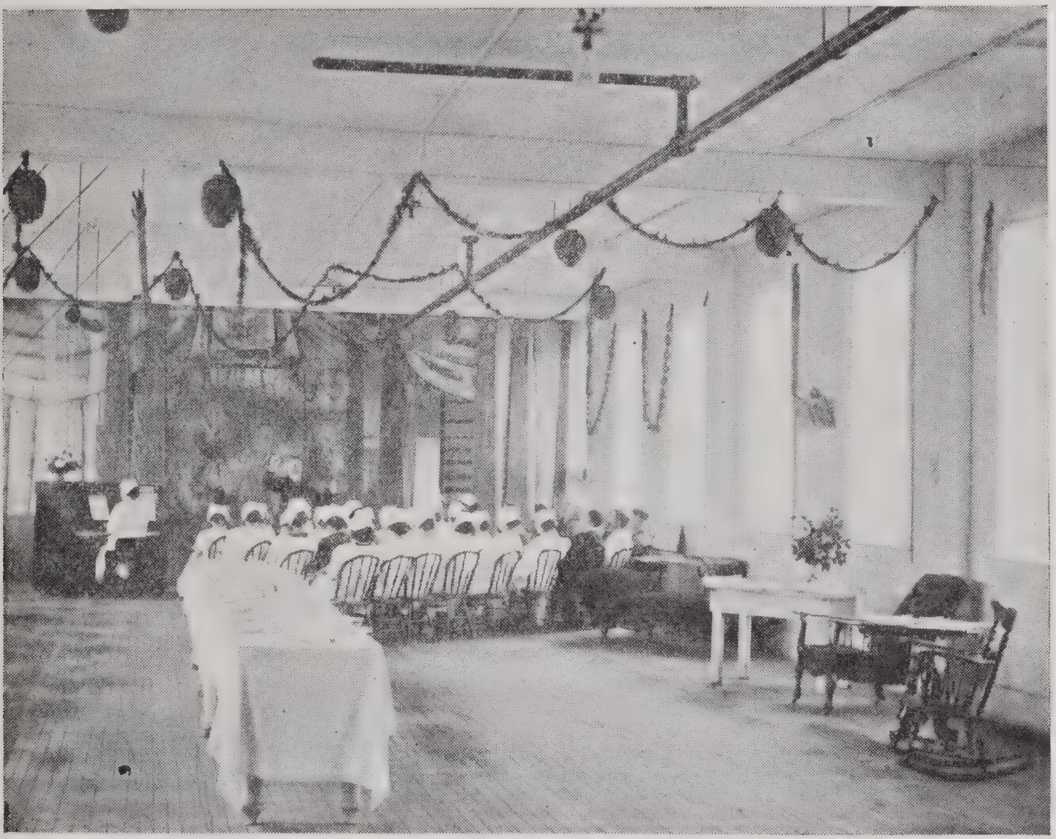


FIG. 122.—Recreation room in welfare department of Dunkirk Laundry, Dunkirk, N. Y.

special linen other than that so-called institutional laundry as represented by bedding, table linen, blankets or curtains.

For a small plant it would not pay to do the special work of shirts, or collars and cuffs, because the processes require special knowledge and special machinery.

The kind of work to be done decides the number of the machines and workers, because at once the schedule of work is varied to accomplish the work required. It will be found that two washers effect a greater saving of time than does one. One of the two may be smaller and can take care of collars, table linen, or private work.

Before going to the manufacturer for the final decision of machinery, a list of all linen likely to be cleaned is needed. Such an estimate can be worked out along this line:

Number of residents to be washed for ....
Number of changes of sheets and pillow cases per person per week..
Number of changes of face towels per person per day, per week..
Number of changes of bath towels per person per week...........
Number of changes of table cloths per table per week...........
Number of changes of napkins per person per week................
Number of changes of lunch doilies per person per week..........
Number of changes of bureau covers per week.....................
Number of changes of sideboard covers per week..................
Number of changes allowed for guests ....
Number of changes allowed for emergencies.....................

Along with this listing comes the need to know the sizes of all linen. The size of sheets and the various pieces of household linen will help to establish the weight of the wash, and from these weights and dimensions the laundry machine man will estimate the size of the machines and the number of each kind required. The laundry machine man has standardized his machines as to capacity of work; for example, the number of feet of sheet per minute ironed in an ironer, how many face towels will demand the same amount of use of the ironer as a sheet. With all this information, he is ready to work on floor space and the problems of light, ventilation and routing of work.

Details of machinery and equipment will be found in Chapter XXII.

Suggestive List of Equipment for 200-Bed Hospital

1 water softener, if water is hard
2 washers
1 heated tumbler or 2-cabinet drier
1 26″ extractor
1 4-roll ironer
2 body press units
4 ironing boards—electric irons
    —gas ironers
12 H.P. Engine
1 starch cooker
1 copper soap tank
4 set tubs
2 truck tubs
4 10-bushel canvas trucks
1 clothes rack for flat-work ironer
1 large table—metal top for folding
1 long table shelf for sorting
1 collar and cuff starching machine
1 closet for stain outfit
    droppers
    beakers
    funnels
    funnel rack
    test tube rack
    chemical bottles with
        ground glass labels
        ground glass stoppers
1 marking table
1 marking machine
1 curtain drier
    measuring glass
    scales—oz.
        —gram
    filter paper
    enamel bowls—several sizes
1 closet for engineer
    wrench
    screw driver
    oil can
    grease container
    waste container
    scissors
    washers
    packings for washers
1 closet for supplies
    muslin
    felt
    wax
    canvas
    cheesecloth
    brooms
    brushes
1 desk and chair

Questions

1. Draw a floor plan for the laundry department that you consider the most efficient for your plant.
2. What building laws must be considered before finally contracting for a laundry building?
3. Wherein will the Board of Health act as a building control?
4. If you could have just the building of your choice, what materials would be used?
5. For what reasons is iron water piping not an economy?
6. Problem: How large a laundry and how much equipment will be necessary to do the work for a girls' private school dormitory, residence 135—capacity 150?

CHAPTER XXII

THE INSTITUTION LAUNDRY

EQUIPMENT

For the sake of organizing the material the subject-matter on equipment has been divided into two chapters, under the heads of Home Laundry and Institution Laundry. In no way can a hard and fast division be made, because all machinery is related in its work to the general process of laundering. The woman's hands have been copied, as it were, by the makers of small equipment. These small machines have been modified in their mechanical construction to accomplish the increased work that is demanded by the institution and commercial laundries. The commercial laundries have caused the most pronounced progress in perfecting machinery, and the institution can make use of these same machines, as well as most of the commercial methods. Anyone seeking help on equipment should therefore consult both chapters.

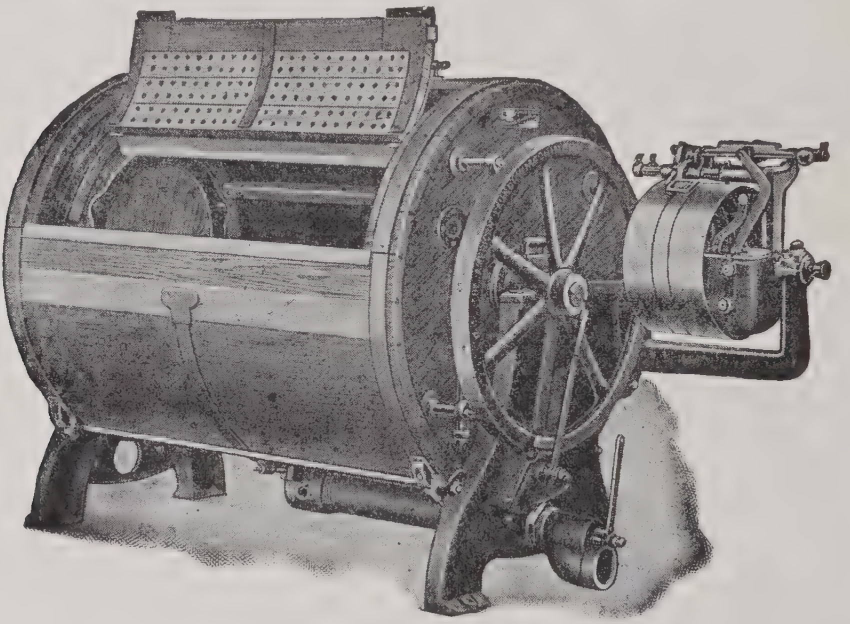


Fig. 123.—Wooden washer.

Washing Machines.—The machines for large quantity work vary in size and in minor parts of construction (Figs. 123, 124, 126), but the general type is a revolving cage with slats or holes. This cage-like cylinder contains the clothes, and revolves in an outer jacket which contains soap solution and water, bleach, or bluing, steam if necessary—whichever is needed for the process at the time. The shift of water is made with the machine in action; all soaking, washing, bleaching, boiling, or bluing may be done without the worker seeing the clothes, and without stopping the machine, provided use is made of a formula that is well established by accurate measurements and by experience.

The newer models of washers have less space between the inner and outer cylinders. This is an advantage because there is greater opportunity for the clothes to be in direct contact with the water and soap, besides the greater economy of all special supplies. (See p. 77.) The small space between the two cylinders reduces the chance for loss of small garments between the two. This is of less importance, because a sheet or other large piece can always be drawn out from the inner cage and over the opening to catch the smaller articles.

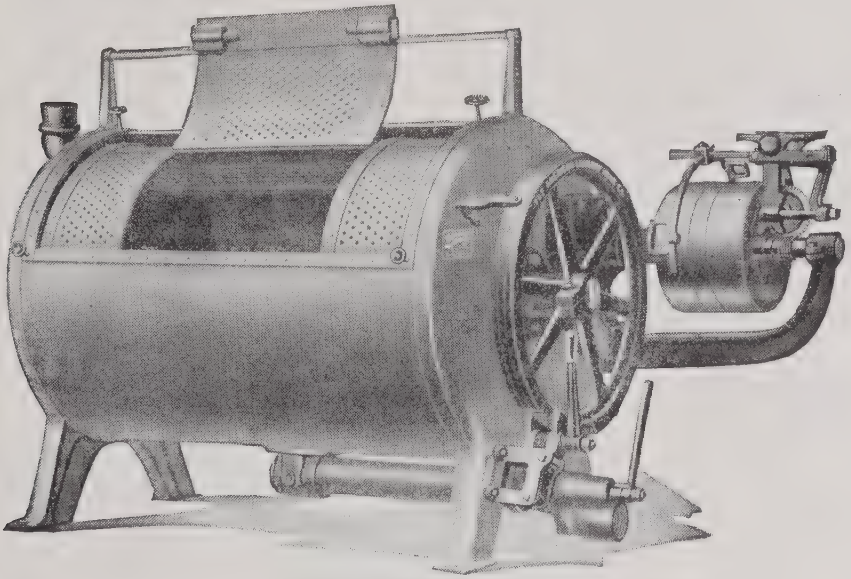


FIG. 124.—Metal washer.

Some machines, having divisions or pockets, are known as compartment washers (Fig. 125). The division is made from top to bottom, with one door to serve both sections. Such a division helps to keep the load organized, and to make the load easier to handle. Another compartment washer is called a "Pullman;" in this type the cages are divided into small sections with a top and bottom "berth" for clothes in each section. Such a washer may have as many as eight sections, each capable of carrying about twenty-five pounds, dry weight. This machine would be most useful for community or coöperative laundries and for so-called wet-wash work.

MATERIALS.—The washers vary in the material which is used for the inner and outer cylinders, and the choice between them depends upon the type of service they must give. The washers with perforated or slat-like wooden inner cylinders are cheaper to purchase, are estimated to give twelve to fourteen years of service, and are not harmed by soda. In fact, soda, which forms a coating on metal cylinders, really bleaches the wooden ones and keeps them white. The hinges on both wooden and metal machines are of brass, which is non-rusting. The metal inner cylinders, however, have certain advantages. Being made of copper, with heavy brass hinges, they are non-rusting and extremely durable. If cared for properly, their life is practically without limit. In a dormitory or a laboratory where the plant may be closed during the long school vacation, the metal cylinder will not deteriorate as will the wooden one, for the latter is very likely to dry out to the extent of warping or even of falling apart. Machine manufacturers are prepared to replace worn inner cylinders and outer drums. Every machine should be equipped with a gauge to register the amount of water in the machine.

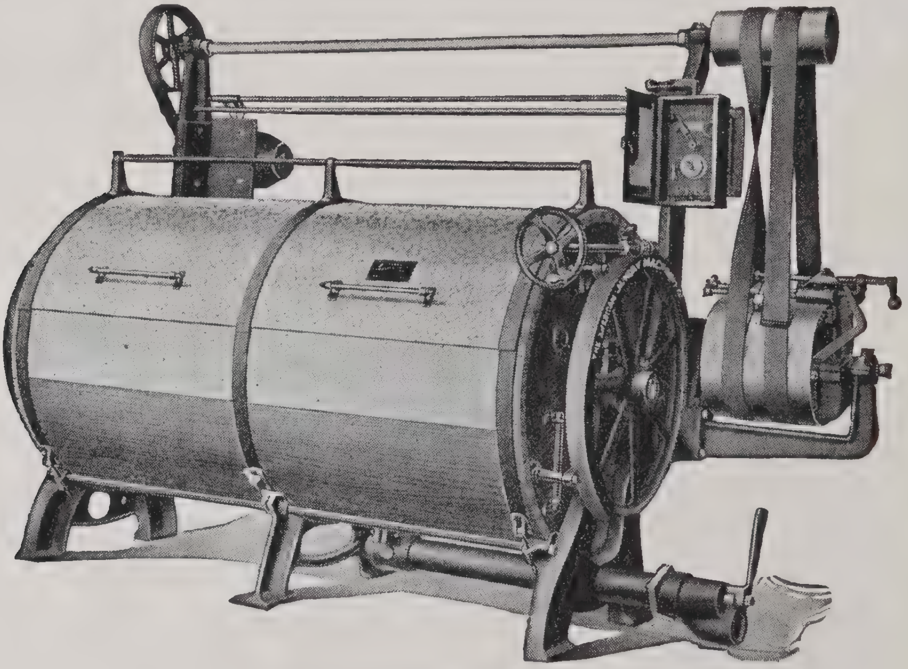


FIG. 125.—Compartment washer.

Size.—Washing machines for institutions vary in size from those that wash thirty pounds at a time to those that accommodate a load of about two hundred and fifty or three hundred pounds. This weight is estimated from the dry weight of linen. The weight capacity of a metal cylinder is about five per cent. greater than that of a wooden cylinder. A metal washer measuring 36 inches by 54 inches will carry about one hundred and twenty-five to one hundred and fifty pounds of clothes as compared with about one hundred pounds carried by a wooden washer of the same size. In deciding the size of the washer needed, several factors must be taken into consideration, such as the number of residents to be served and the dry weight of clothes to be handled. (See pp. 73, 264.)

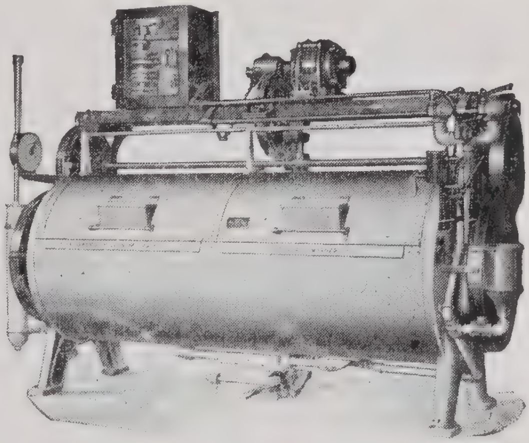


Fig. 126.—High duty washer.

Placement.—The proper placement of the washers will do much to increase their efficiency. Of course, they will be connected with water and steam pipes, and to outlet drains for the waste water. The inlet pipe should be fully two inches in diameter, and the outlet pipe not less than four inches. A large outlet pipe from the washer permits quick shifts of water.

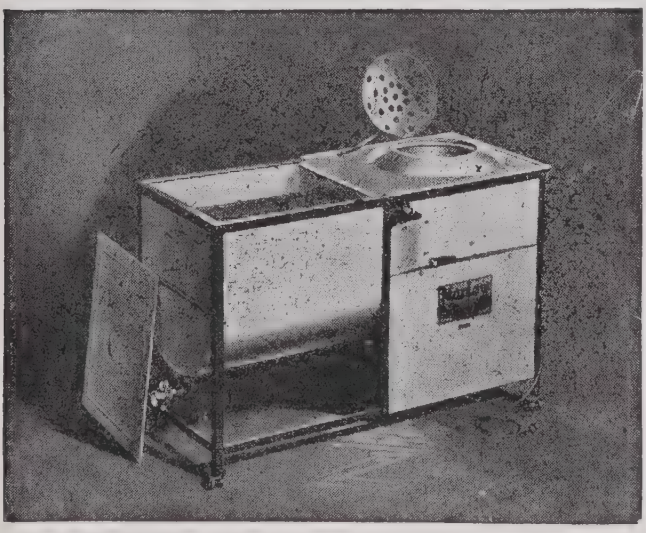


Fig. 127.—Marlow washer with extractor.

The washing machine should be placed over, or preferably in, a sunken drain, and should have an open drain pipe. (See Fig. 128). The advantage of this is the possibility of general inspection of the wash water and of the various rinses. This open drain is also an aid in finding small articles, like bits of lace or handkerchiefs, which have not been put into nets and may have fallen between the two cylinders. By filling the washer, then opening the drain with the inner cylinder revolving, the lost piece floats out into the open drain where it can be easily reclaimed. Such a drain should have capacity for rapid emptying and sufficient pitch to prevent the water from standing or backing up into the drain. A washer need not be low, even though it is thus placed in the drain. It can be set at the proper working height by being mounted on a cement base moulded in the floor of the drain.

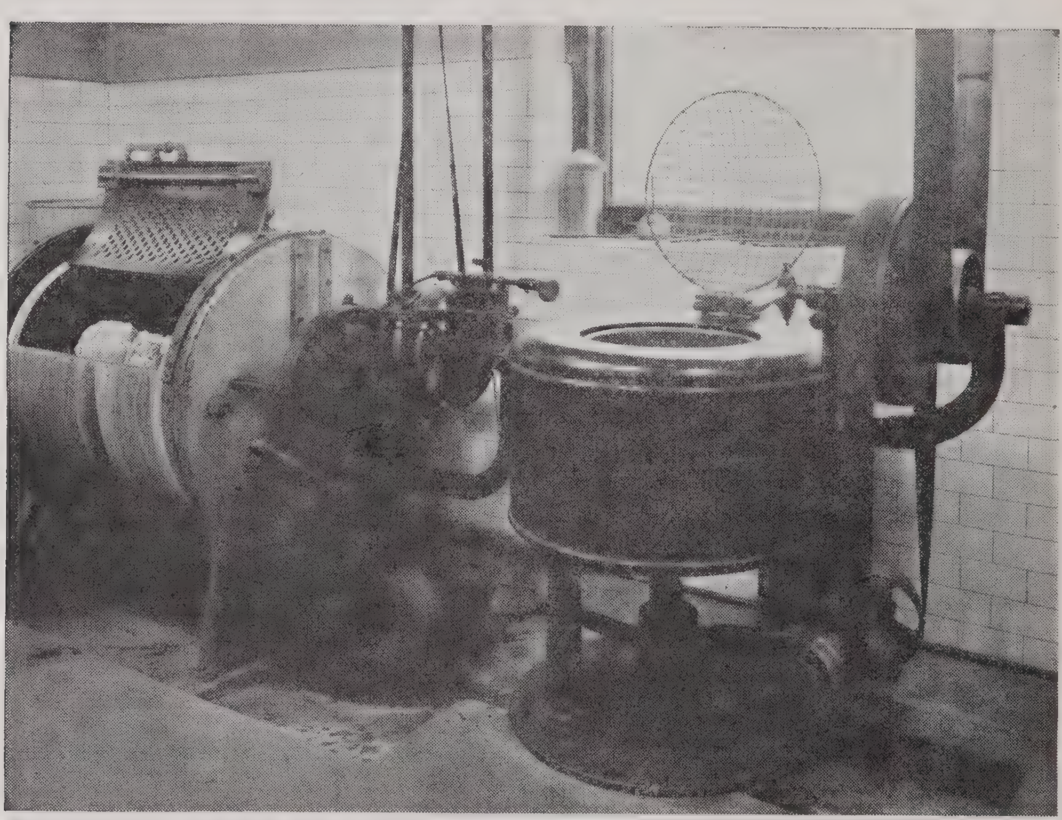


FIG. 128.—Good drain arrangement for a two-piece unit.

When this drain is planned, have it wide enough to catch the overflow water from the wall of the washer. In other words, have the drain wide enough to extend a little beyond plumb line drop from the wall of the washer. This is especially necessary if the soap solution or bluing is poured into the machine from a pail, without the convenience of a funnel or bowl receiver such as a few expensive machines have. All these points should be considered, as they contribute to a dry, sanitary washroom.

VENTILATORS.—Over each machine should be placed ventilators to carry off heat and steam (Fig. 129). Ventilators in the laundry are most essential as outlets of moisture and of heat, because the two combined cause a humidity in the workroom which is oppressive and does much to lower the efficiency of the workers. Experts in health studies claim that the fatigue from humidity is listed first as the cause for disease among the workers. Any machine burning gas or acetylene should have its own ventilator, set directly over the heating appliance, lest the worker inhale the gases which form from poor combustion of the fuel or from leakage.

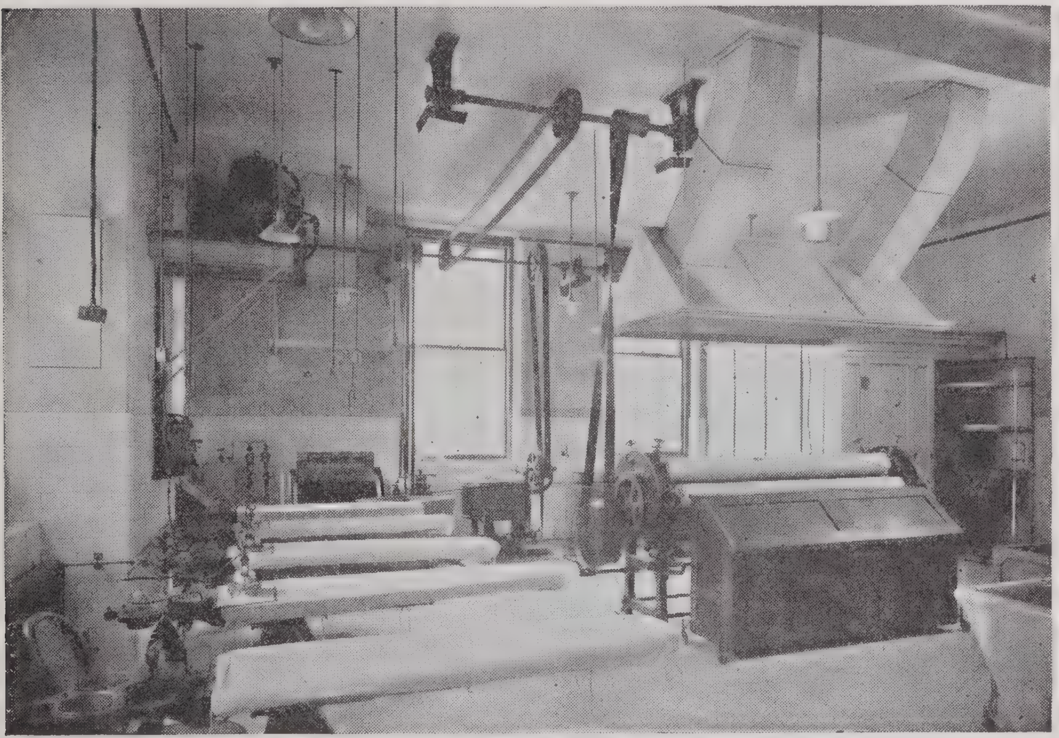


FIG. 129.—Good light and ventilation shown in this picture.

Extractor.—The extractor is one of the most essential machines in the laundry, as it is the machine which saves work, time, and money that would be required for hand wringing of clothes. The extractor is a centrifuge, which consists of a metal basket revolving in a closed outer drum. The inner basket revolves with enormous rapidity on the central pivot, and this centrifugal action throws the water from the center out through the holes in the side of the basket. (See also p. 84.)

TYPES.—There are two types of extractors—the *under-driven* and the *over-driven*. The *under-driven* or pivot extractor is a basket which is mounted on a revolving upright rod (Fig. 130). The circumferences or rims of the outer and inner baskets should be equally distant at all times to show balance. Either of two irregularities may be responsible for the machine being out of balance—the basket is unevenly loaded (one side of pivot heavier than the other), or the cushion springs are worn and need replacement without delay.

The merit of an extractor is to carry a large load in balance, and to balance the weight by the clothes themselves as it gains in speed. The basket of an under-driven extractor must revolve without wabbling or being out of balance. Momentum sometimes hides a lack of balance, but the continuance of such unevenness involves a dangerous risk. The rapid revolving of the basket produces so much extra weight on the heavy side that there is serious danger of the spindle breaking. If the shaft breaks, the result is like an explosion, and the whirling basket would literally break loose and might mean all sorts of destruction to plant and employees.

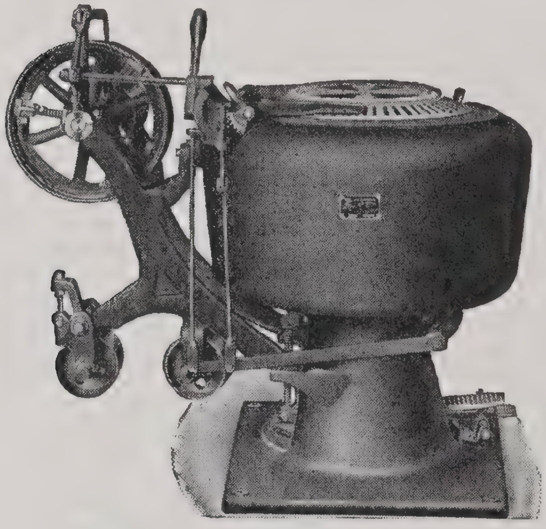


Fig. 130.—Underdriven extractor.

The modern extractor is operated by a push button which has no power to start the machine as long as the cover is up from the basket. Such a machine is constructed to be "fool-proof," because the cage cover acts as an automatic control, preventing any accident to hands and arms of the operator through starting before the machine is closed. The old type extractors are started by a lever, with no balance control other than the careful worker putting equal weights of clothes on each and all sides of the central pivot. The older of these machines have no cover whatever, or if they have, too often the careless employee tries to create a better balance by keeping the hand on top of the extractor as it gains its speed. This is so dangerous a practice that an employer should enforce a law that this act brings dismissal. The old extractors bought without cage covers may have a cover bought, and any mechanic will be able to drill through the shell of the outer drum and attach the cover with rivets. It will not be an automatic control top, but a great safety device, nevertheless.

The *over-driven* extractor (Fig. 131) is especially suited for heavy work, like bundle work, or the flat work of the institution. It is more easily balanced, or perhaps more truly is never out of balance. To quote from a machinery catalogue: "The basket can never swing wide and strike the curb, regardless of how unevenly it may be loaded, for the reason that the spindle to which it is attached has a bearing at both its upper and lower ends, the bearing at the lower end being in the bottom of the cast curb. Thus, while the basket easily revolves within the curb, it cannot oscillate, and regardless of the speed at which it may be driven, the circumference of the basket is always in the same relative position with the circumference of the curb."

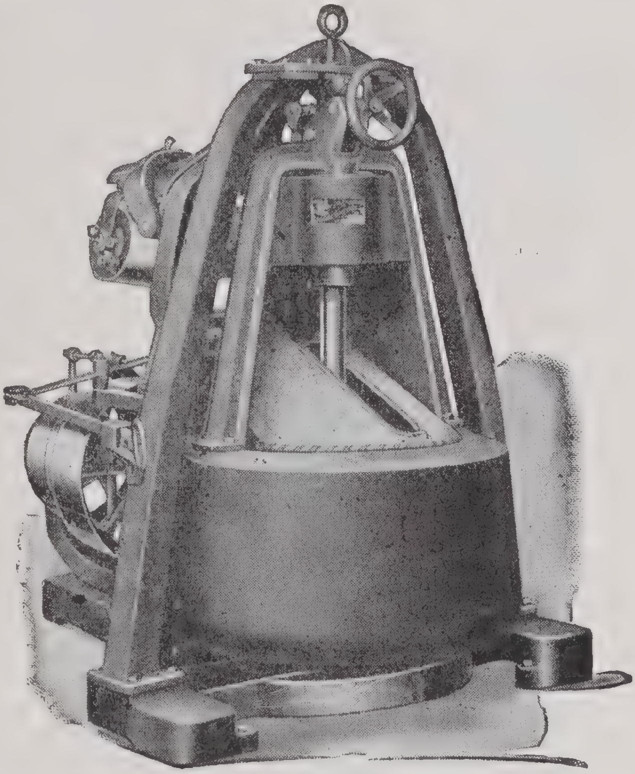


Fig. 131.—Overdriven extractor.

Size.—These extractors vary in size from 20 inches in diameter to 48 inches in diameter. The smaller sizes are *under-driven* in type; the 20-inch size will carry about 35 pounds dry weight of clothes, the 26-inch size about 57 pounds. Extractors above 30 inches in diameter are *over-driven;* the 40-inch and 48-inch sizes will carry respectively about 150 and 200 pounds, dry weight. The larger the diameter of the extractor, the slower the action, and the slower the drying, because the water has a greater distance to go. Also, there is a larger mass of clothing to free from water. The revolutions of an extractor may be tabulated by size and relative number of revolutions per minute:

20″ basket	1400 revolutions per minute
24″ basket	1300 revolutions per minute
26″ basket	1200 revolutions per minute
30″ basket	1000 revolutions per minute

A medium-sized extractor—20 inches to 24 inches—is a good choice, if only one is to be used. Should a second machine seem necessary, it is wise to consider an *over-driven* type for the larger work, like bundle work, or heavy institution work. A two-piece unit, consisting of a washer and extractor, is shown in Fig. 127. Such a unit would be suitable for small plants.

Usually one extractor carries the work of two washers, because the time for each extraction is short—from three to ten minutes, according to the work required. To give an idea of size, a 20-inch extractor (*under-driven*) will require two packings to extract the clothes from a one-hundred-shirt washer, or about fifty pounds of dry clothes.

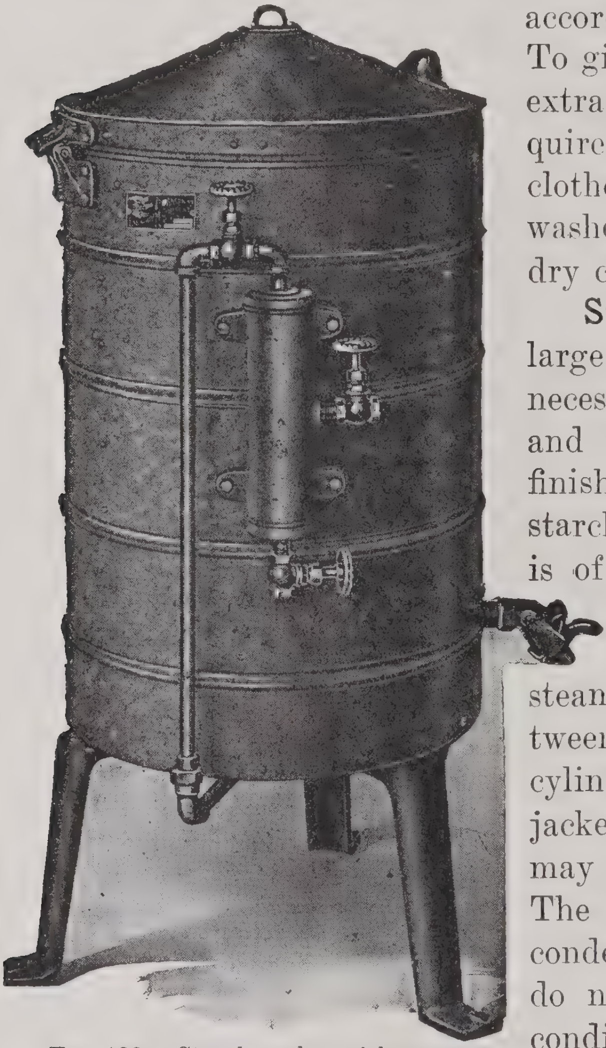


Fig. 132.—Starch cooker with steam condenser.

Starch Cooker.—To cook large quantities of starch, it is necessary for economy of material and for more perfect results of finished garments to have a steam starch cooker (Fig. 132). This is of copper, white metal lined, and is constructed like a double steam cooker with steam piped into the space between the inner and outer cylinders. It is called a double-jacketed starch kettle. It may or may not have a steam condenser. The cookers without the steam condenser are less expensive, but do not keep the starch in good condition for as long a time because there is great evaporation. Should the worker not allow for this loss when making her measurements, the amount of the cooked starch at the end of the cooking period would be greatly reduced. In the cooker with a steam condenser the moisture is more permanent because less evaporation takes place. The starch does not dry, does not form a "skin," nor become reduced in quantity and increased in thickness. Therefore, it would seem that in this case, as in so many others, a little extra initial expense would soon justify itself in the saving of supplies and the improvement of results.

Starching Machines.—These vary considerably in general appearance and in details of construction, so it seems wisest to explain here the principle by which starching is done in a machine. The starch has been cooked according to the special recipe for the special kind of linen to be starched, collars and cuffs, for example. Then, in the collar and cuff starching machine (Figs. 133 and 134), the dried collars or cuffs travel through the starch solution in the container, between corrugated rolls revolving like a clothes wringer, or on feed belts. Some machines are modeled

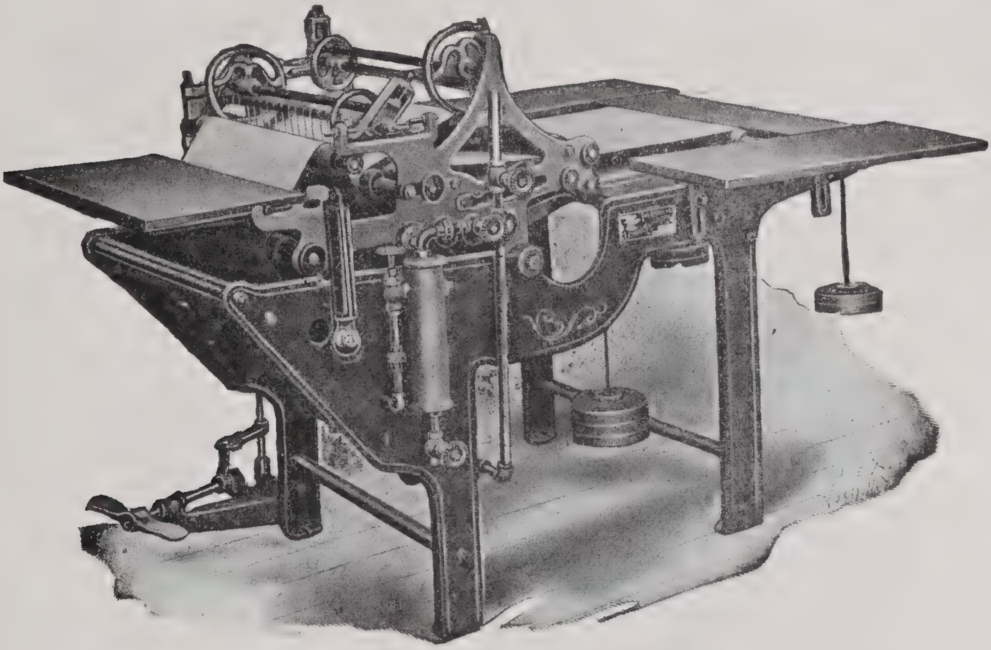


Fig. 133.—Collar and cuff starcher.

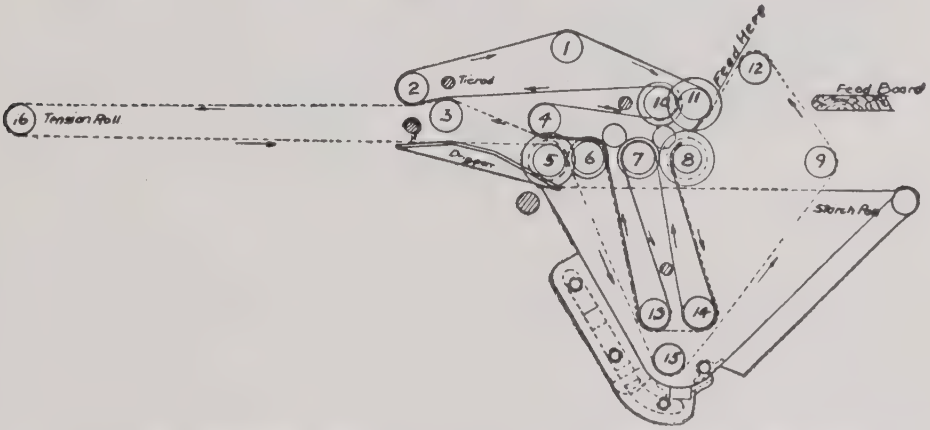


Fig. 134.—Sectional view of Fig. 133, showing operation of machine.

on the principle of a pair of hands rubbing starch into the garment. By means of pressure, and because of the correctly proportioned starch solution, the fabric is forced to absorb quickly the right amount of starch. Then the collars and cuffs pass from the starch pan between padded rolls, which remove excess starch from the surface.

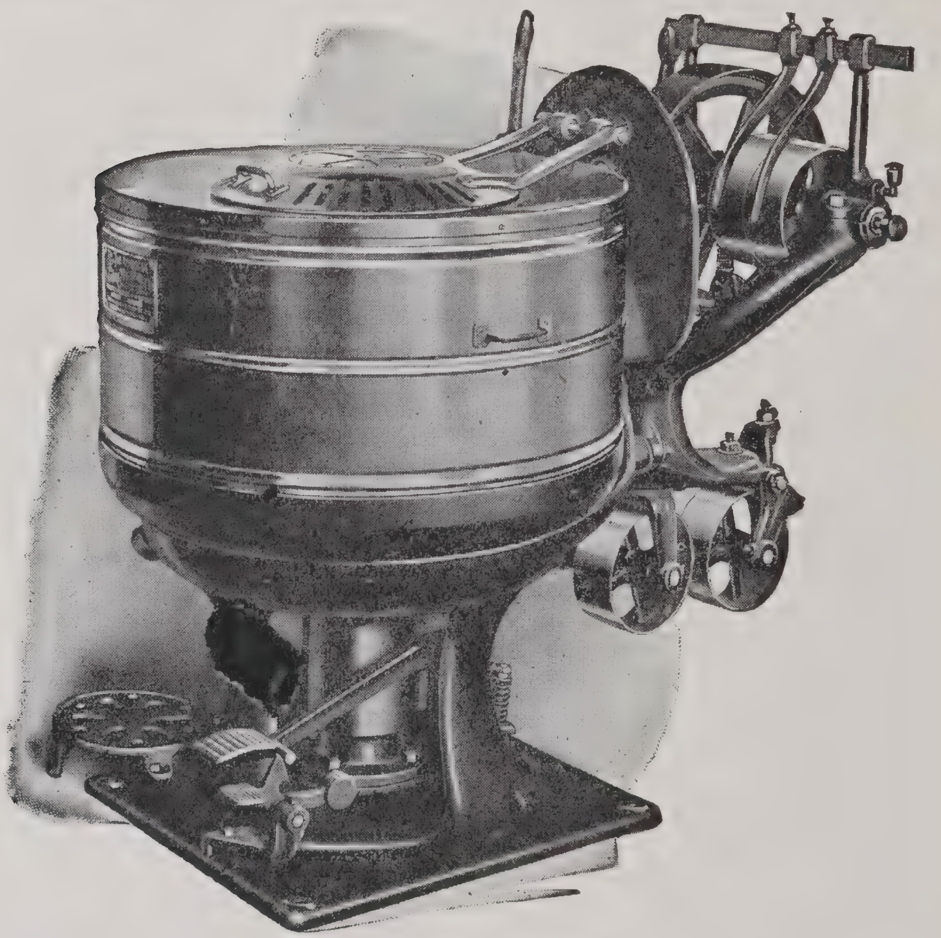


Fig. 135.—Starch extractor.

For starching of body garments, including starching in the washing machine, see Chapter IX.

Barrel and Dip Wheel Starchers are good for the smaller laundries where starch work is in small amounts. Both machines are constructed according to the same principle of agitating the collars and cuffs in starch paste. They involve, however, much handling of the small pieces, and every piece must be wiped by hand.

Starch Extractors represent a saving (Fig. 135). Any extractor could be used, if it were not for the hindrance it might cause through delaying the regular work of extraction, which is always large in quantity. The starch can be saved by putting a pail under the drip-pipe. In the process starch is extracted like water by the centrifugal motion. The work is very rapid; the starch may be used again; and, if the garment is properly extracted, it is in good condition for ironing without drying.

The extractor should be washed after being used to extract starched clothes, in order that no starch may remain to coat the basket or to adhere to the next load of clothes.

Tumbler.—A tumbler is of much use in loosening the tightly packed bundles of linen as they come from the extractor. It is of great assistance to the shaker, saving time as well as the garment. Tumblers of the old type differ greatly from the new machines. The old machines were wooden-slatted revolving drums, which rolled the clothes slowly in one direction until the heavy, packed wads were tossed and loosened (Fig. 136). Now the modern machines are built of wire caging, and are revolving inner cylinders in a closed heated metal outer cylinder, like a washer (Fig. 137). The cage justifies its name, because it is made of heavy galvanized wire. The doors of the tumbler are like those of any metal washer. When the heated tumblers were first used, the great difficulty was the lint, but that difficulty has been overcome by screens and suction blowers that take up the lint as fast as it forms. Fans force good circulation of the heated air. The tumbling, combined with air and heat, produces rapid drying. The process is especially

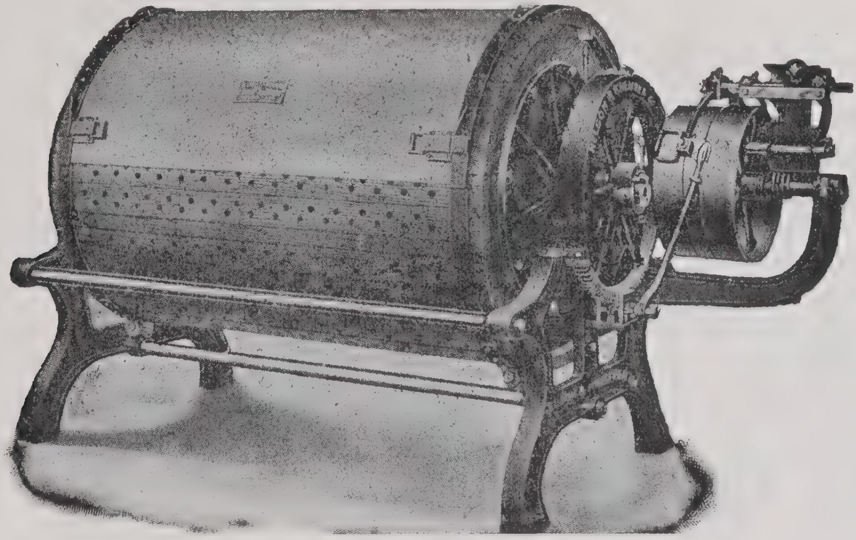


Fig. 136.—Cold tumbler or shaker—belt drive.

good for stockings, underwear, pillows, and all garments needing a soft and fluffy finish.

Heated tumblers are better than dry rooms, as they occupy less space, cost less, and leave the clothes in a softer condition than do driers.

The special work of the tumbler (as used at present) is to toss and dry the clothing that is not to have much other special finish. (See also p. 86.)

Driers.—The large *steam drier,* such as is used in hospitals and commercial laundries, is used less now than before the heated tumbler was invented. It is possible to do without any drier in institutional and commercial laundries where flat work is the principal type. The new method of starching also reduces the need of a drier, leaving the collars, cuffs, and shirts as the only garments especially dependent upon it.

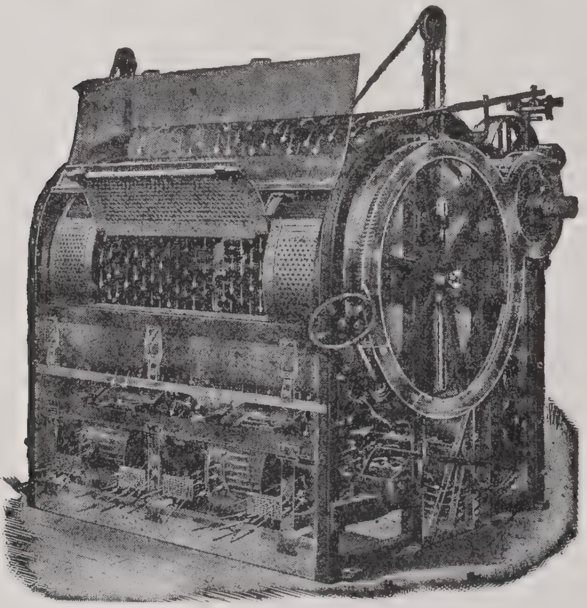


Fig. 137.—Heated tumbler, showing air currents.

If a drier is to be installed to give the best service, it should be attached to a flue leading to the top of the building, and preferably in a corner where the two walls of the room may be used for two walls of the drier. Do not place the drier in the middle of the room, as it hinders supervision of the work, especially in a small room. The drier should be in close relationship to the extractor and to the starch outfit. The patented driers have large electric fans attached to the ceiling, and steam pipes are placed on each side of each compartment. The heated air in constant circulation and the ventilation by means of the flues cause very rapid drying. A steam drier should never be used without a fan or some means of ventilation, as it becomes a hot-box, and will yellow the clothes. If the laundry is equipped with a two-compartment drier, it will be found quite a saving to have three trucks, or drying racks. The extra truck can be used in a convenient part of the laundry room to hold a quantity of clothing while the material inside the drier is drying.

The *conveyor drier* is literally a traveling drier, carrying the shirts, collars, and cuffs, or the heavier garments on their journey in and out through the heated compartments. It is a chain conveyor which is geared to make the journey in a time set for the drying of the work. At the end of the journey, the finger hooks automatically lift the dried garment and drop it into the basket, which stands on the floor, so that all a worker in the laundry must do is to hang the garment at the beginning of the journey. A combination conveyor and cabinet drier (Fig. 138) may be obtained for the small institution, and will be a much-used piece of equipment if any shirts or collars and cuffs are washed.

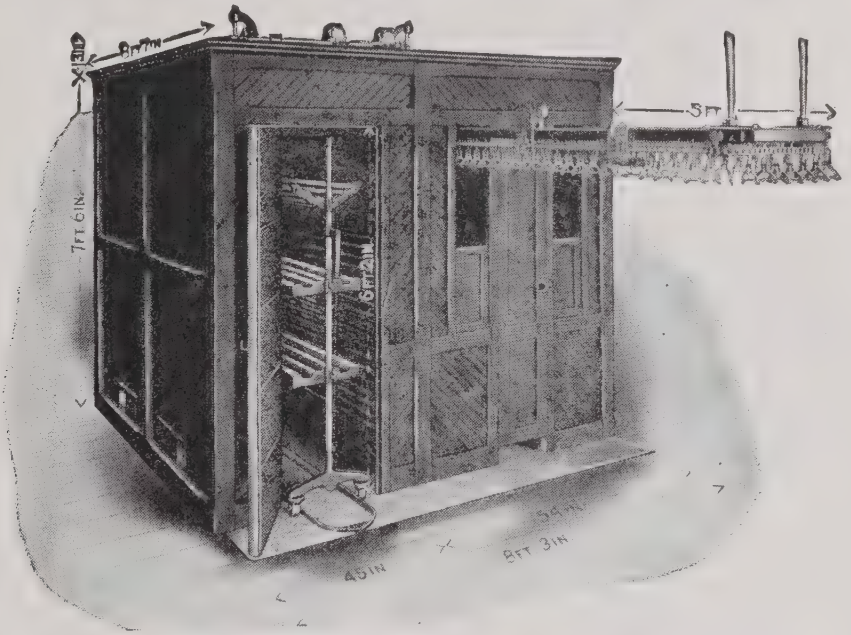


FIG. 138.—Combined cabinet and conveyor drier.

CURTAIN DRIERS.—The driers for curtains are in principle like any drier, with the addition of frames. The fan is not used as in other driers, because the strong circulation of air would literally blow out the starch from the thin material. Some curtain driers have the stretchers run horizontally into the drier like drawers, others have stretchers which turn over, waffle-iron fashion, into a heated box. Many institutions use scrim or cheesecloth curtains, which may be ironed on the flat-work ironer, thus eliminating the necessity for a curtain drier.

STOCKING DRIERS are really steam-heated stocking forms. The principle is similar to that of the flat wooden stretchers used to shape the stockings and to prevent shrinkage. The forms, however, are not flat, but cylindrical, with steam piped to the inside of the cylinder. Stockings stretched over these heated forms dry in a few minutes.

Ironers.—Ironers are the third essential, as it were. First, the washer, then the extractor, and to complete the essential equipment, the ironer must be considered. It is only in places where much starch work and special work is done that the unusual or special machines are necessary. The flat work is always in the largest proportion, and in hospitals forms very large daily work. For a small plant there is quoted in manufacturers' catalogues a "three-piece unit." This consists of a washer, an extractor, and a flat-work ironer (Fig. 139).

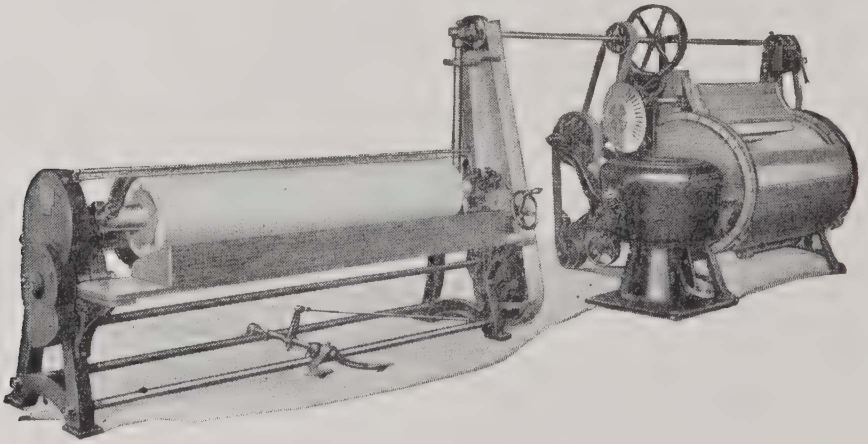


Fig. 139.—Three-piece unit.

Heat for Ironers.—Some small ironers are electrically heated, or heated by gas, or acetylene. (See p. 240.) These are very satisfactory for light home work where the machine has time for reheating between processes, but are not built to carry the heavy work demanded in an institution.

All ironers are sufficiently hot when a single thickness of material is ironed dry with one passage through the ironer. Heavy materials like counterpanes must go through twice to be entirely dried, or the machine must have gearing reset for slow revolving, and hence slow ironing.

Steam-heated ironers are most efficient, but are possible only when a high-pressure boiler can be provided. They are more even in the degree of heat given, and retain their heat longer (Fig. 140). The high-pressure boilers, which supply the steam, vary in their capacity, but pressure of fifteen pounds to the square inch is the smallest for laundry service; this is the size used in very small plants, because often the operator is a woman. The law in many communities prevents a woman from operating a higher pressure boiler; but she may operate two (fifteen-pound) boilers which stand side by side. For hospitals and institutions where a large quantity of work is done, the laundry should be assured of eighty to one hundred pounds pressure, when needed. Below that amount the moisture of heavy linen deadens the heat of the ironer and reduces its efficiency. This amount of steam will be enough to boil the clothes, to heat all presses and ironers; and the exhaust steam will heat the water.

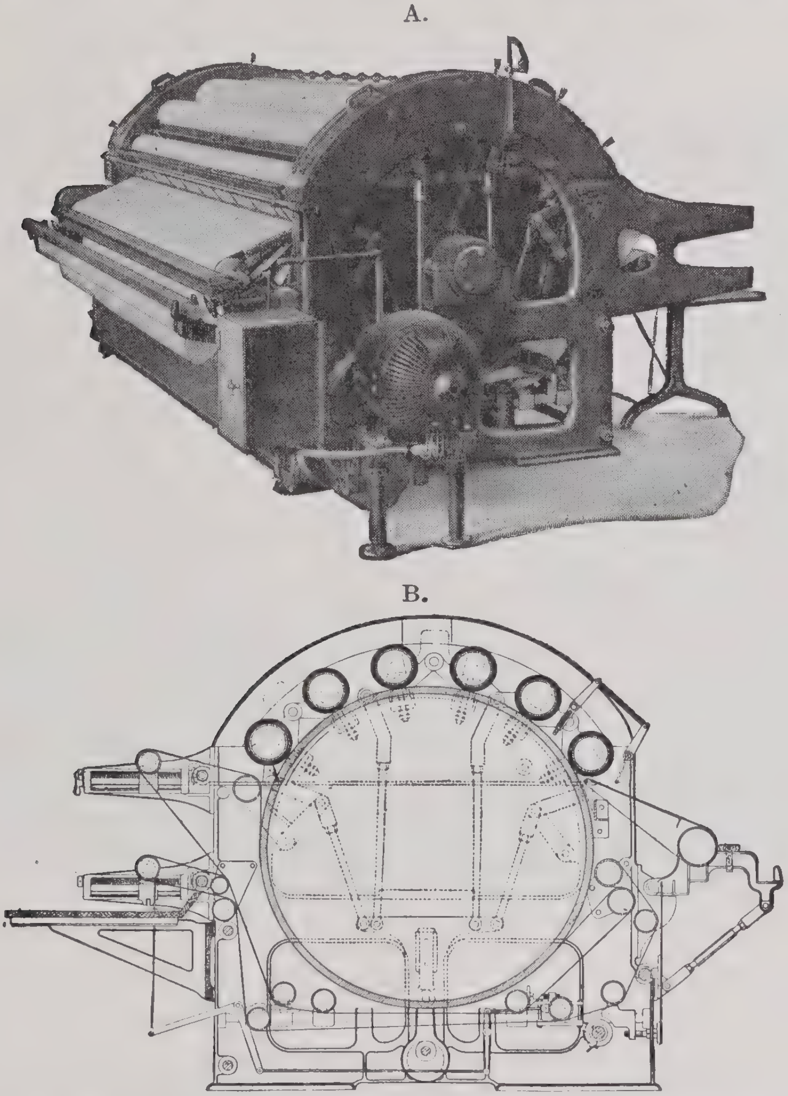


Fig. 140.—A. High duty ironer. B. Diagram showing operation.

Pressure.—The cloth rolls and heated steel cylinder revolve on each other, and are set with pressure treadle or screws; the rolls should come together so closely and press so tightly that the ironing is done as well as or better than by hand work. (See also p. 91.) The steel rolls, like an iron, should be smooth, free from flaws, and occasionally will need waxing, as every iron.

SIZE.—As to the size of an ironer, it is chosen for its length of rolls and the number of rolls revolving about the steel cylinder.

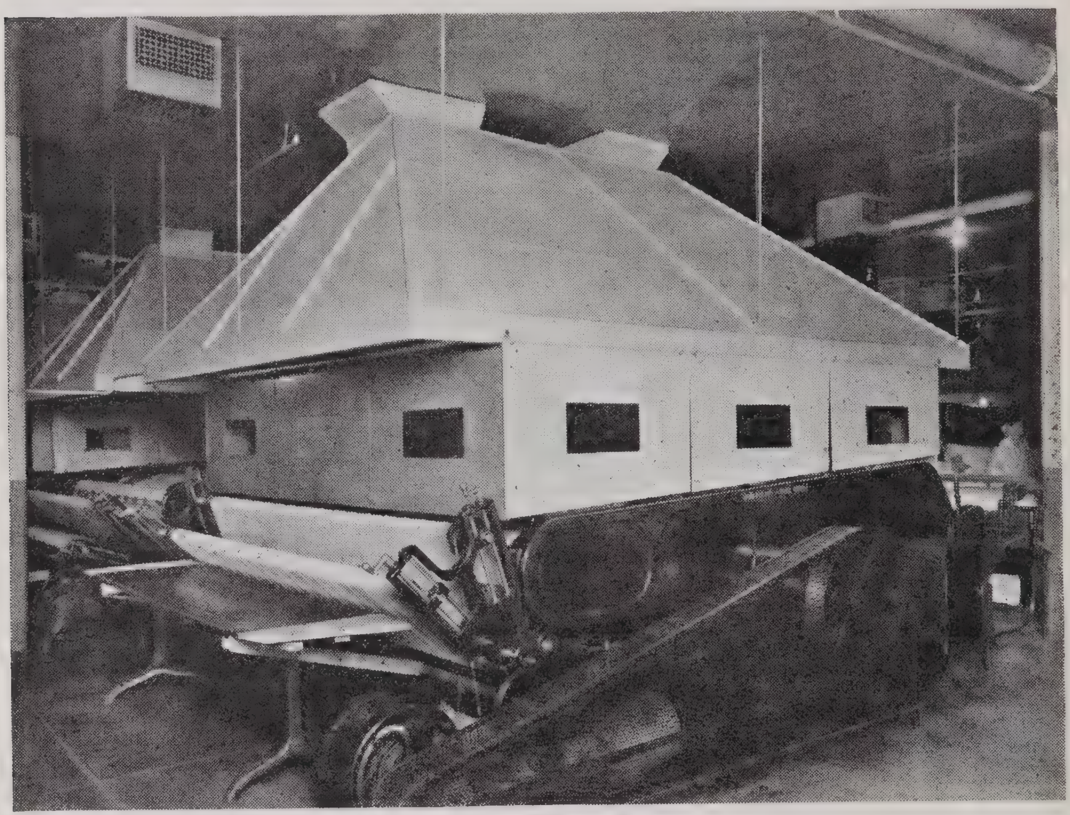


FIG. 141.—Eight-roll ironer, with hood for ventilation.

The small home ironers are forty-two to fifty-nine inches, but that means that only small pieces can go through singly. As soon as large pieces must be folded, the garment has several thicknesses, and the drying capacity of the ironer is decreased. This means slower work, for the garment must be fed into the machine as many times as are necessary to dry it. Two handicaps are at once met. The cloth covers and the felts on the ironers become so damp that they do not dry with one ironing, and the excess moisture produces steam, which does away with the gloss finish most housewives like. The second difficulty is that to feed folded garments into the ironer is to make heavy creases, which with continued folding will cause the material to crack on the creases.

If work is to be done quickly, as it must in an institution, the size of single and double sheets or of tablecloths should decide the size of the ironer as to its length of roll. As to whether the ironer has one to eight cloth rolls depends upon the money possible to be used and the size of room. A one-roll ironer is slow. It must revolve slowly; the roll itself is larger than if it were one of three or eight, because time must be allowed to let the cloth dry. With one roll there is less chance for evaporation of moisture, and the roll is likely to be damp. The most efficient ironers have six to eight rolls, and do from one to three sheets per minute (Fig. 141).

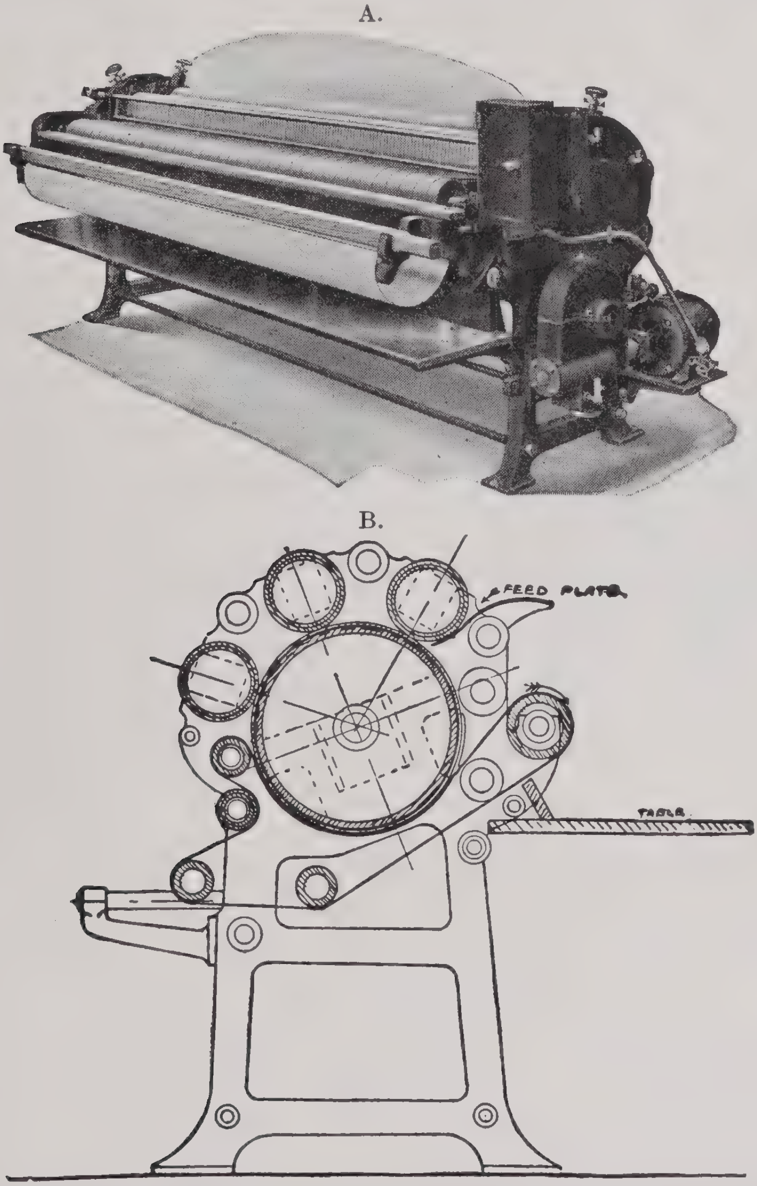
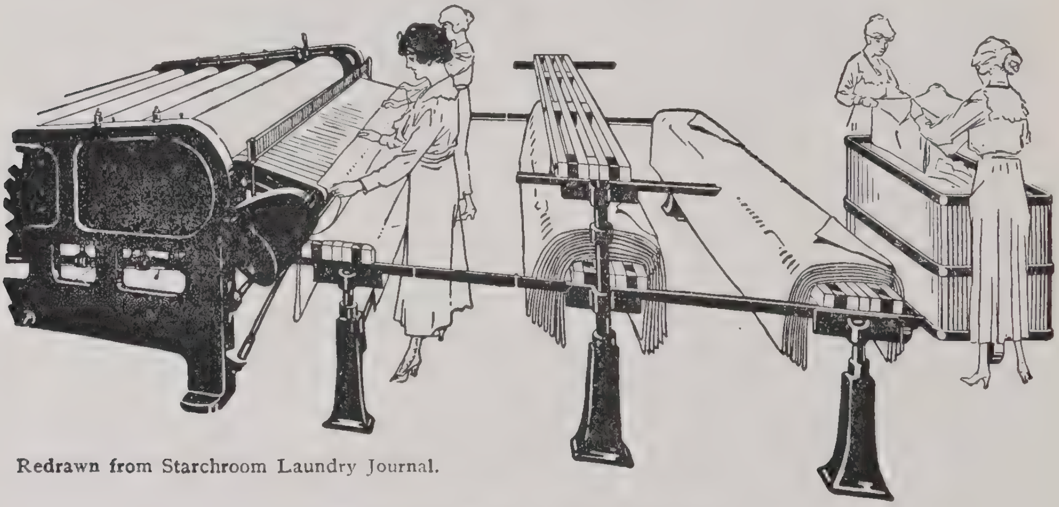


Fig. 142.—A. Return ironer. B. Sectional view, showing operation.

Special Attachments.—These large ironers are equipped with a speed control, so that when heavy fabrics like counterpanes, or double thicknesses, like pillow slips, are fed, the slower speed may be used to give time for drying as the fabric is ironed. In addition, the workers can have time to feed the smaller pieces, like pillow slips, more evenly and economically. Such ironing represents economy of power, feed ribbons, and time. (See also p. 89.)

To make the ironers safe for the workers, a feed control is attached to the machine just above the feed ribbons. It is like a gate, which when lifted automatically stops the machine. Other types of machines have a heavy steel roll which is never hot, but under which everything enters the ironer. It is an excellent warning to the unthinking worker (Fig. 142).



Redrawn from Starchroom Laundry Journal.

Fig. 143.—Racks for flat work linen.

With the thought of meeting many needs, flat-work ironers have been improved to meet the need for economy of equipment and for production of ironed family work at almost the flat-work price. Heretofore, as suggested, the flat-work ironers have been able to finish only " flat work " or such flat things as sheets, table linen, or any garment that was without buttons or heavy gathers. The new ironer has rolls equipped with springs, which permit the passage of heavy and uneven garments that could not go through the regular type ironer. In this way a garment with gathers, though less perfectly finished than if ironed by hand or on special machines, will be ironed in much less time than would otherwise be possible, and also at less cost on account of the saving in necessary equipment. Thus such a machine represents an economy of time and a great saving of money, giving to the housewife the satisfaction of having clean, sanitary and good-looking clothing at a rate a little higher than rough-dry work, but estimated by the dozen or by the pound. In an institution where clothing must be kept clean at the least expense, such an ironer has the greatest economic value.

Individual Motors.—Each machine should be equipped with its own motor. The initial cost will be greater, but the great saving in power as well as in wear and tear over a system of a single drive with shafting and belts will easily balance such cost.

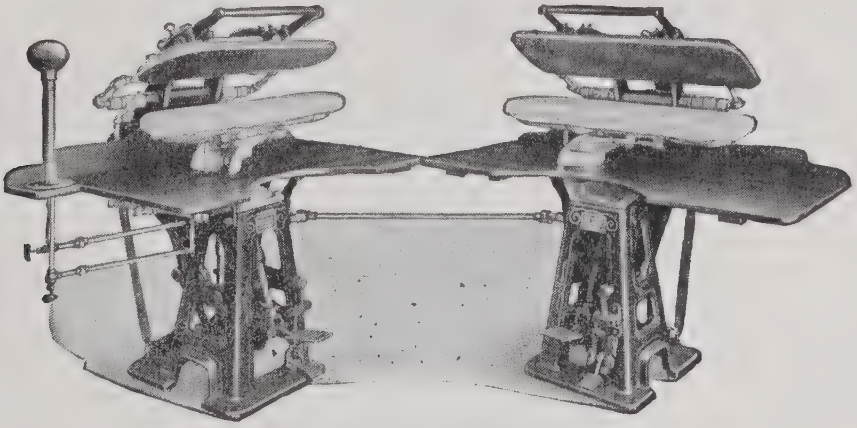


Fig. 144.—Twin body press.

Individual motors are safeguards because, when necessary, the worker may instantly cut off the power of that special machine without hindrance to the rest of the work. This system does not require overhead belting leading from the shaft, so that all corresponding danger, noise, and vibration are reduced. With the motors mounted on the machines there is no danger of clothing catching in belts. If belts are used, the law requires that for safety's sake every belt must have a cage protection. This increases the work of keeping the room clean; therefore the elimination of belts and shafting materially decreases the amount of cleaning.

Ironing Presses (Fig. 144) operate by means of foot treadles, leaving the hands free to shape the garment. The steam presses have an ironing board, as it were, which is padded and steam heated; above this is a heavy finished plate which is like an iron. Pressure on the foot treadle lowers the hot iron onto the padded steam-heated board; the steam moistens the garment, while the iron removes the creases. These presses are most efficient in doing both cotton and wool coats and trousers; they also iron skirts, aprons, and dresses well. Starch work is well done on a press. As mentioned in Chapter VI, the same general rule must be used with ironing on presses as with flat-work ironers—shape the garment with the grain of the goods, and iron it until it is dry.

BODY IRONERS.—The reverse body ironers are to a considerable extent giving way to the presses. The body ironer is constructed with one metal cylinder in which gas produces the heat, operating with a revolving padded cloth roll (Fig. 145). By the pressure of the foot treadle the padded roll is brought into contact with the heated shoe, after the garment has been introduced through the open end of the ironer and placed on the padded roll. The first treadle, when pressed, makes the contact; a second treadle controls the ironing because this treadle may produce a reverse action. An ironer without reverse action would be inefficient, because of less control in the ironing of the garment. The ironer would have to be stopped, the garment replaced on the top of the roll, then the pressure put on for a second ironing, necessitating much handling.

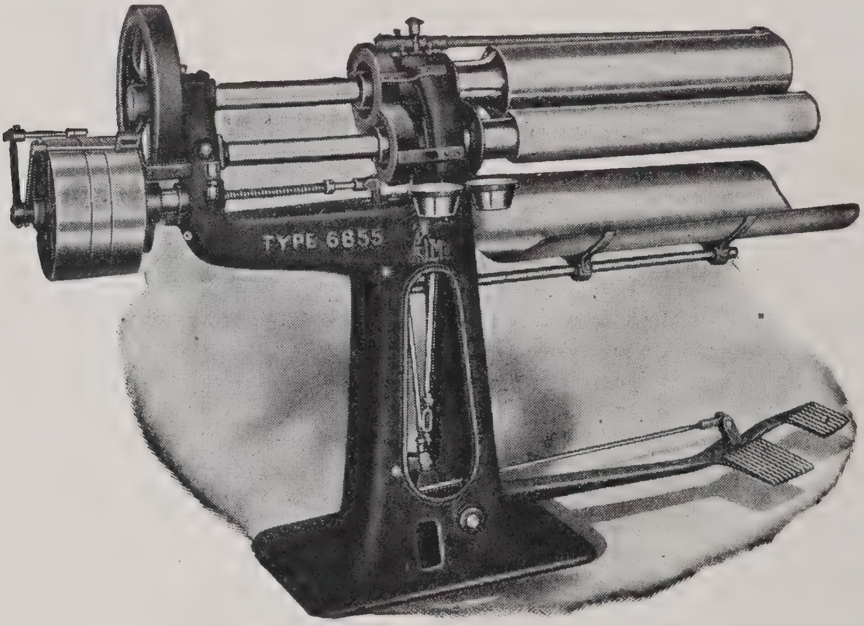


FIG. 145.—Body ironer.

Collar and Cuff Equipment.—STARCHING MACHINES.—See p. 275.

DAMPENERS for collars and cuffs used to be of the press type machine. Huge blocks of collars were built up by placing layers of flat collars or cuffs between damp muslins. The press was screwed down tight, and the moisture was forced to permeate the whole stack.

More rapid moistening is done by feeding collars and cuffs through a machine not unlike the starcher in appearance (Fig. 146). The carry canvas is wet, and the dry collars and cuffs are moistened in the journey through the machine on this canvas.

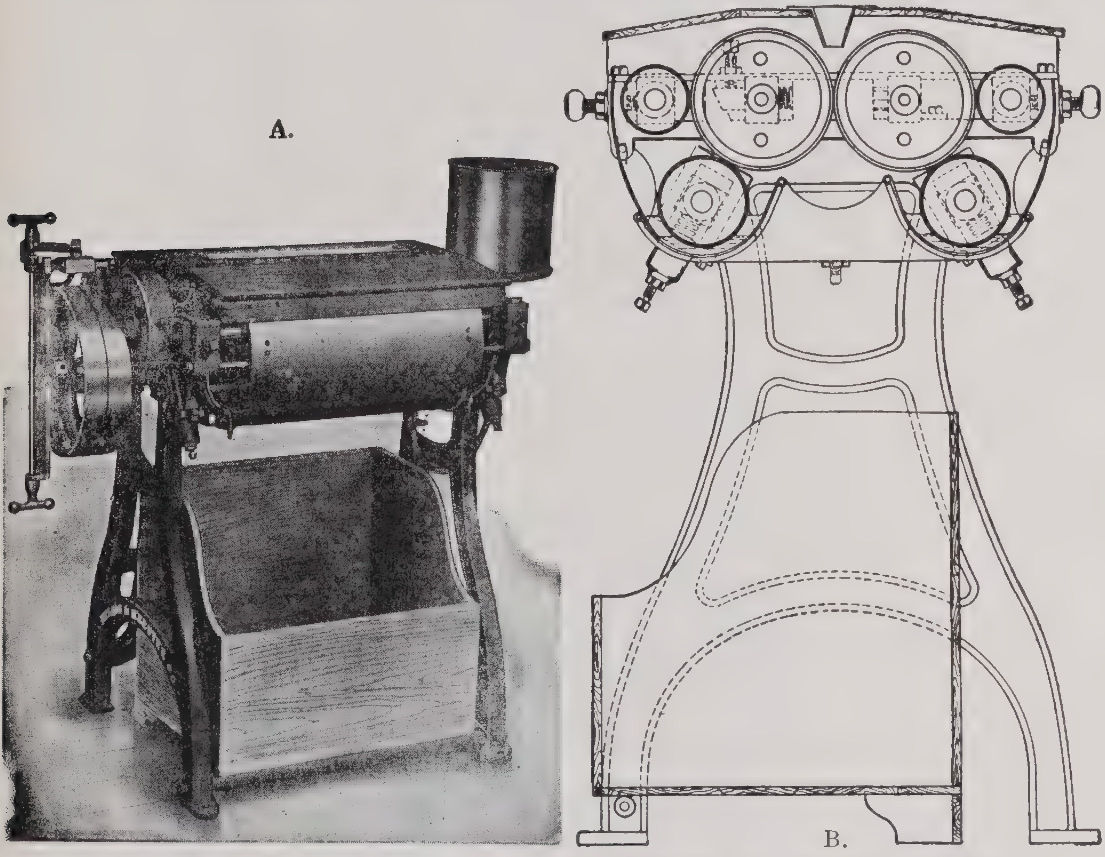


Fig. 146.—A. Collar and cuff dampener. B. Sectional view, showing operation.

Collar, Cuff, Bosom, and Neckband Ironers are either revolving roll ironers (Figs. 147-150), like the body ironers, or they are pressure ironers, like the steam press ironers. The body ironer type is constructed with two rolls—one a heated roll, and one a padded roll which revolves in contact with the heated roll, with the garment between. The press ironer is shaped especially for its work of cuff and collar ironing, or bosom and neckband ironing. In these presses the steam-heated padded board, with its dampened and shaped garments, is raised to meet a heated metal plate, which removes the creases.

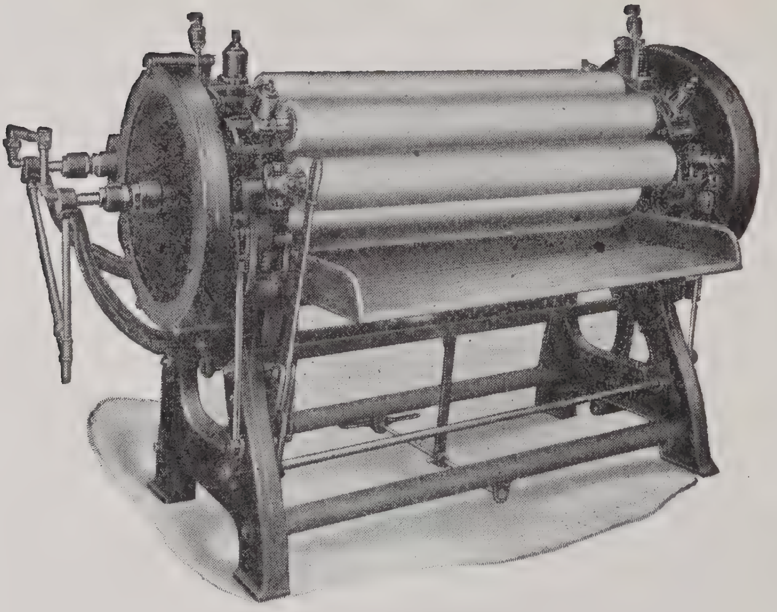


Fig. 147A.—Collar ironer.

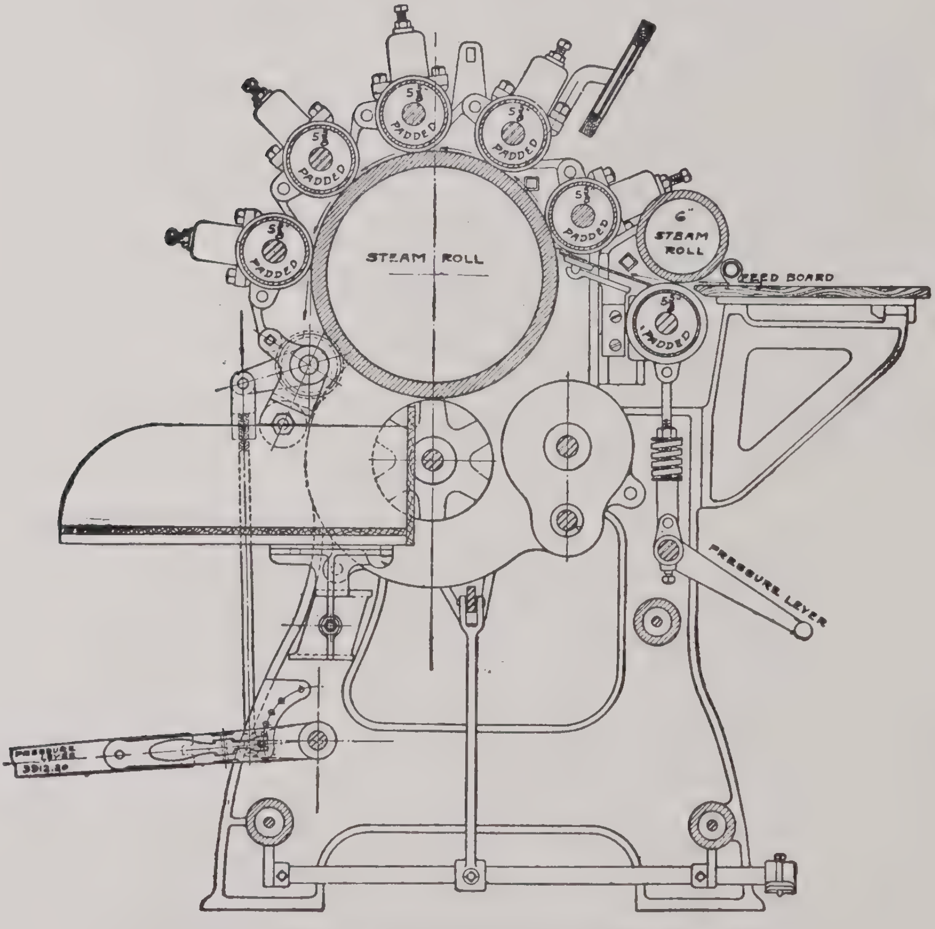


Fig. 147B.—Sectional view of 147A, showing operation.

Moistening and Finishing Machines for collars have been improved and increased in number. The original moistening machine was a small device operated by hand. It was a felt wheel, moistened and quickly run over each collar along the line of folding. The newest moisteners are machines into which the collar is fed, being moistened on the fold line as it goes through. Then the collar goes through another, spiral-shaped machine which folds, glazes, and shapes it. Such machines finish dozens of turn-over collars per minute. There are in the trade even machines which turn back the points of standing collars. Another special

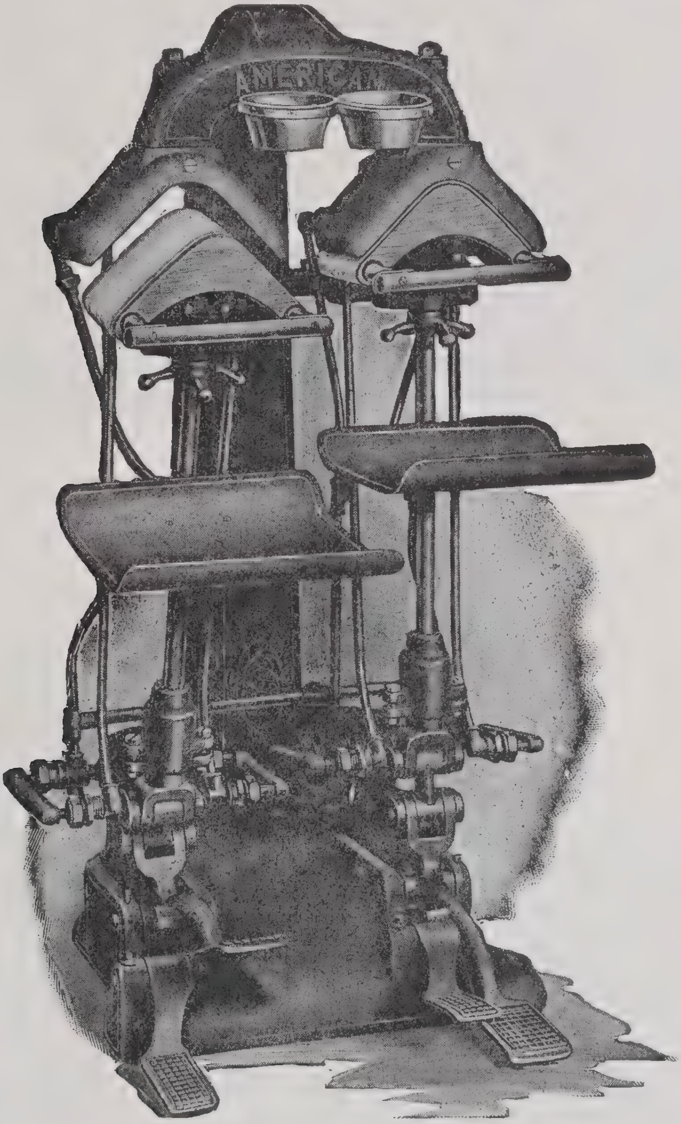


Fig. 148.—Cuff press.

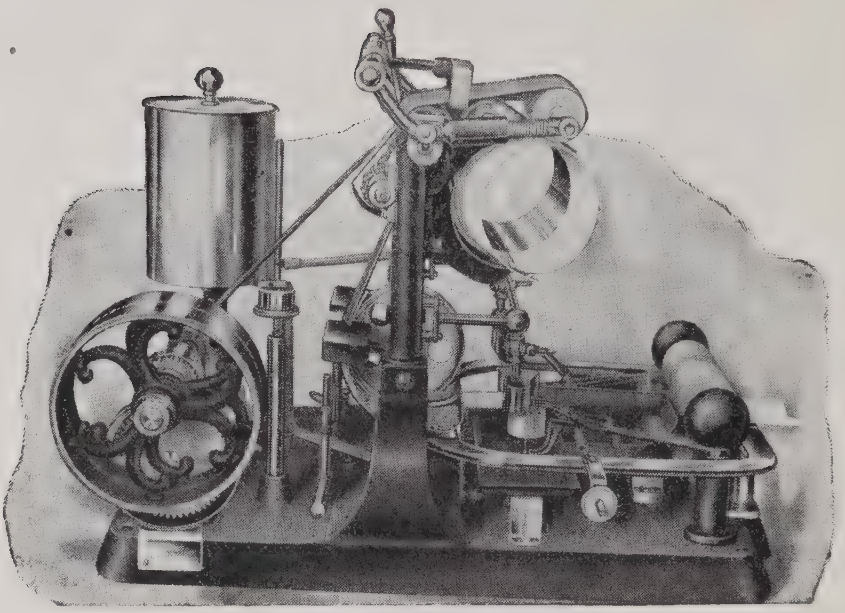


FIG. 149.—Collar finisher.

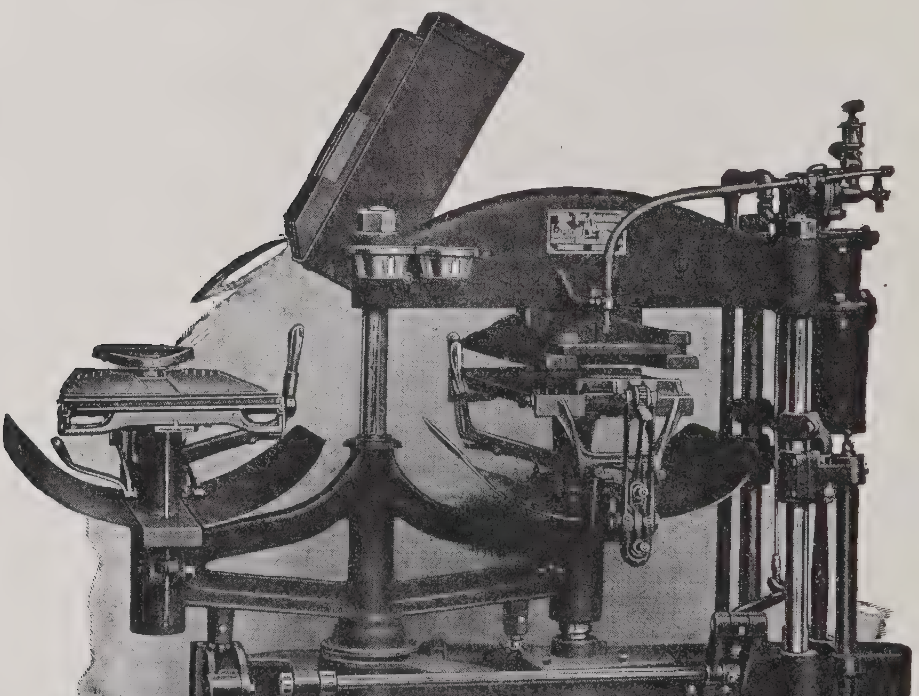


FIG. 150.—Bosom press.

machine " mends " a worn or torn collar by applying starch where needed, and makes a " new collar "—until the next washing.

Ironing Boards.—The ironing boards for large quantity work

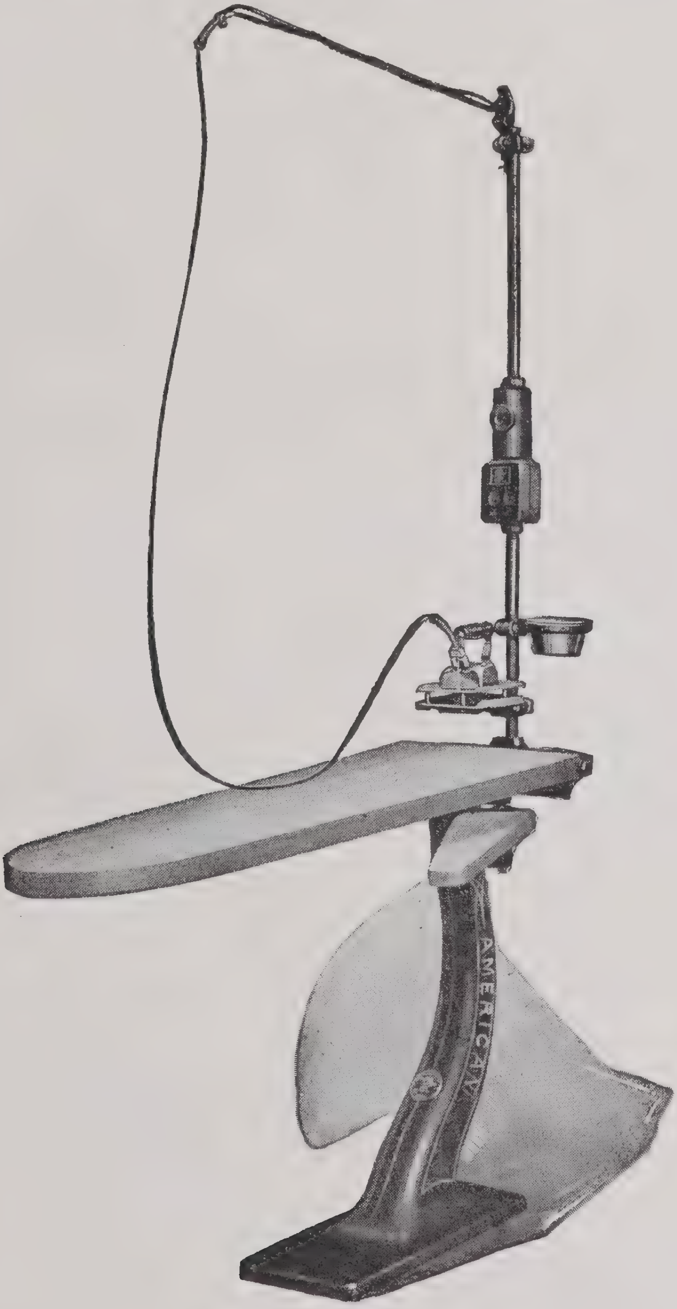


Fig. 151.—Ironing board.

are usually stationary, and equipped with all the essentials for good work, such as water pans and gas stove or electric iron. Figs. 151 and 152 show two types of such boards. Revolving ironing boards have a special use in the hand ironing of round tablecloths and large round centerpieces. They are simply revolving ironing boards which make it easier for the worker to reach all parts of the cloth comfortably without undue handling. The worker may use a gas-heated or electric-heated iron.

Felts.—The padding for ironing machines and presses is made from either hair padding (goats' hair), cotton, or wool felting. *Hair padding* is cheap at first cost, but has no renewal possibility. It is not so well adapted to speed work, because it does not absorb moisture readily. As it deteriorates with heat, the hair pulverizes, and the felt must be removed before this powder becomes a dirt-producing handicap in the work. Usually a sheet asbestos about

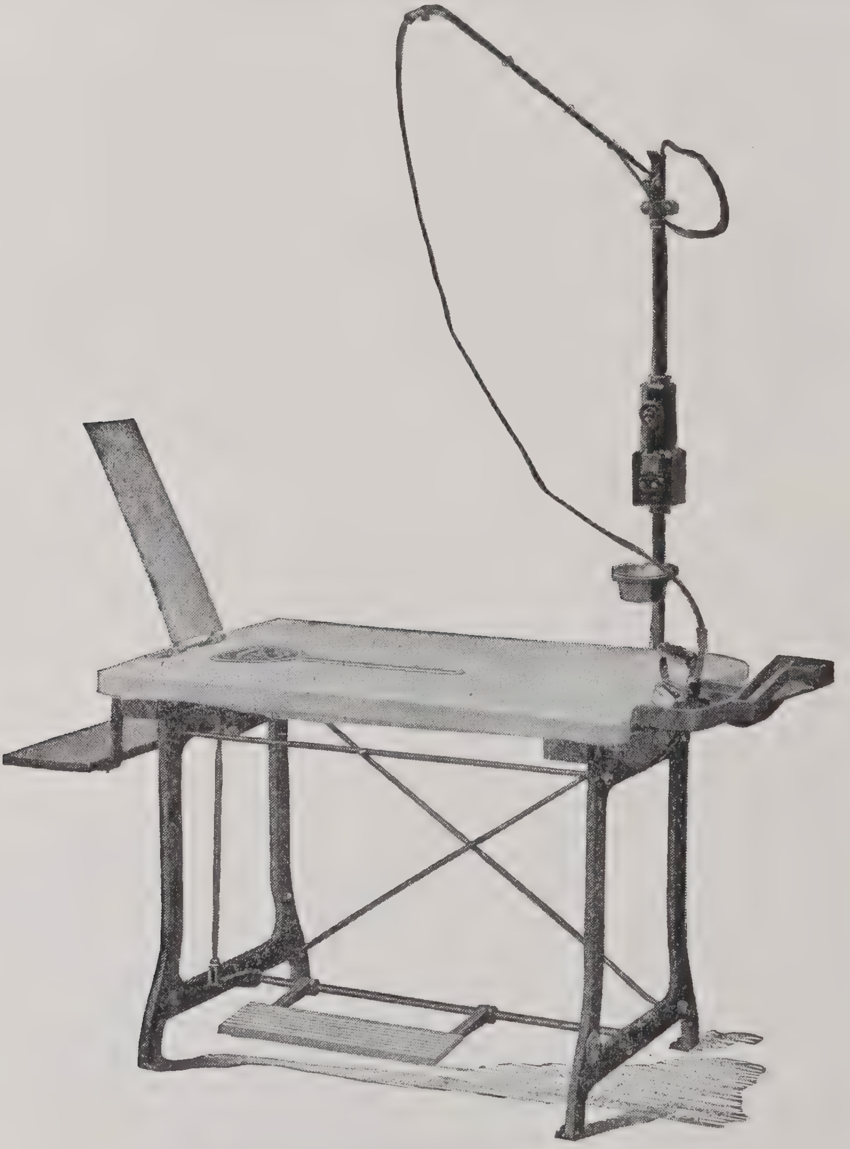


Fig. 152.—Ironing table for bosom work.

as thick as paper is used as a lining to prevent scorching, and the hair is enclosed in cheesecloth. Hair padding is sold in bales.

The *cotton pads* are either knit padding or heavy cotton felt, known to the housewife as silence cloth (Fig. 153). The cotton knitted padding is woven with a thin warp thread and a round, wick-like woof thread. The cotton resists scorch more than hair or wool does, but the loose wick thread has no power of refelting or renewing. The padding is cheaper than wool. Many workers like the cotton padding because it gives a product that has a good finish. It is sold in fifty-yard rolls.

Wool felt (Fig. 154) is very satisfactory when initial cost is not the controlling consideration. Like the hair padding, it is put on with asbestos lining, to prevent unnecessary scorching. Wool felt is the most satisfactory in its renewal possibility. If it is kept from scorching and if it is refelted at fairly frequent intervals, it is a most serviceable padding. Some of the worn wool felting may be used, after finishing its service on the large ironer, by being cut for the smaller machines, for ironing boards, and for iron holders. Wool is sold by the pound in bales of fifty yards. For a few cents extra per pound, the felt may be cut as desired. This may be an economy, especially if one has had little experience in cutting felts. Wool felt is put three times around the roll, cotton twice, and hair once.

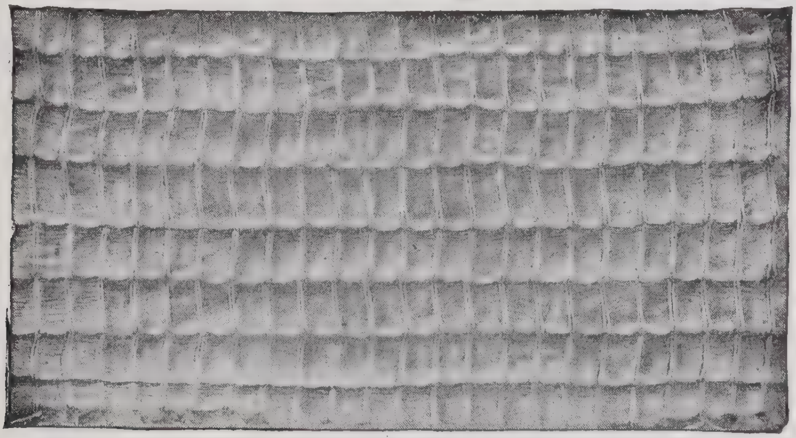


FIG. 153.—Cotton padding for ironers.

Heavy felts, thicker and harder, are used on the bosom, collar, and universal presses, where they are needed to produce the glaze and smooth, stiff finish suitable to such garments.

LIFE OF FELTS.—It is possible to offer only a general study of the life of the covering materials, because conditions vary so greatly. This variance is due to the care used in shutting off steam, the loosening of pressure when the ironer is not in use, and the amount of work to be done. The same kind of covering has histories of usage ranging from one month to ten months. In this comparative study of cost and wearing qualities one must not forget the saving on the felt covers by refelting—either by washing or by steaming in the washer. The frequency of this refelting depends upon the amount of work done, the kind of padding used, care in prevention of scorching and of harmful pressure when the machine is idle, and the method used in refelting. It is an economy to have two sets of felting ready for use, as refelting requires time, and it would be poor economy to keep the machines idle until the felts could be cleaned. For refelting, see p.93.

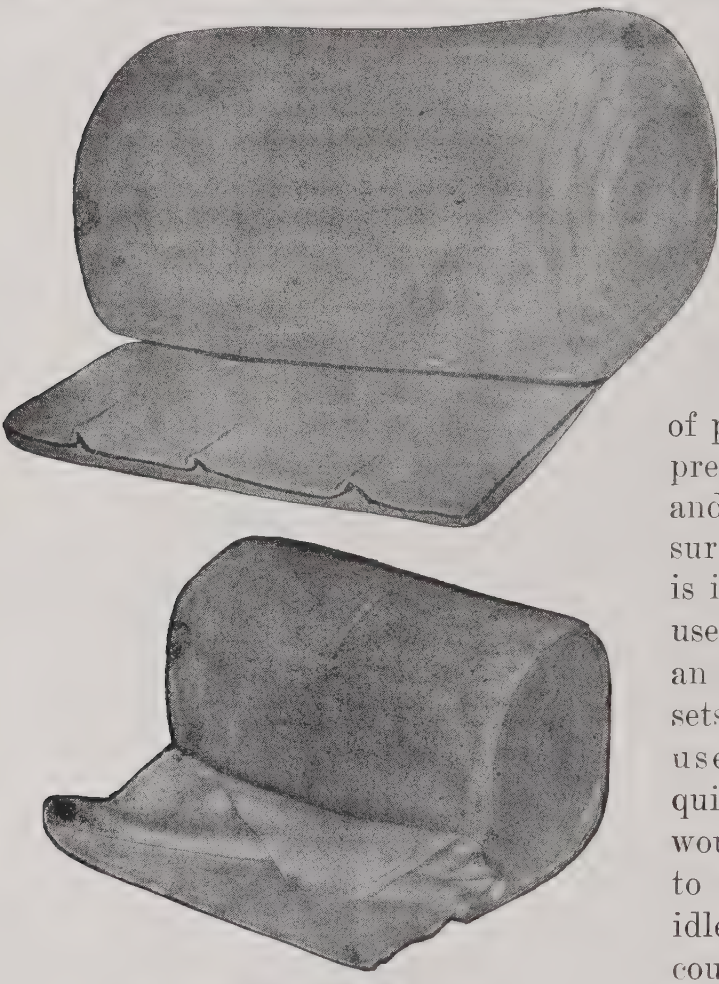


Fig. 154.—Wool felts for ironers.

Muslins.—Muslin covers for ironers should be heavy to resist scorch and to withstand the intense strain of the heat and the tension of the tight rolling. When very fine linen is to be ironed, a fine cover cloth is considered an essential for results. For economy, the ironers are usually covered with a heavy, woven cloth called "canvas," which may be purchased in several different grades. This latter leaves its imprint on fine linen, and for that reason is not considered suitable for ironing thin, dainty fabrics or table linen.

Cut the cover muslins large enough to allow for shrinkage and to allow a tuck-in at the ends over the padding. This prevents the padding from getting soiled with the grease, which is difficult to keep from spreading when it liquefies under the intense heat. The worn muslin or canvas covers from the large ironers can be cut down so that the best is used for the smaller machines and for the skirt and sleeve boards.

Sterilizer.—This machine, which is so necessary for hospital work, is a modified washer. It is of the same general shape, and operates as the washer, but is especially equipped to carry high-pressure steam. The clothes are washed in the usual way. (See pp. 73-75, 80.) Then, when they are boiling, the steam increases the temperature above boiling to perhaps 300° F. This steam is confined in the washer by special screw fastenings on the cast-iron door. The washer is usually sealed for fifteen minutes, during which time the high temperature is maintained.

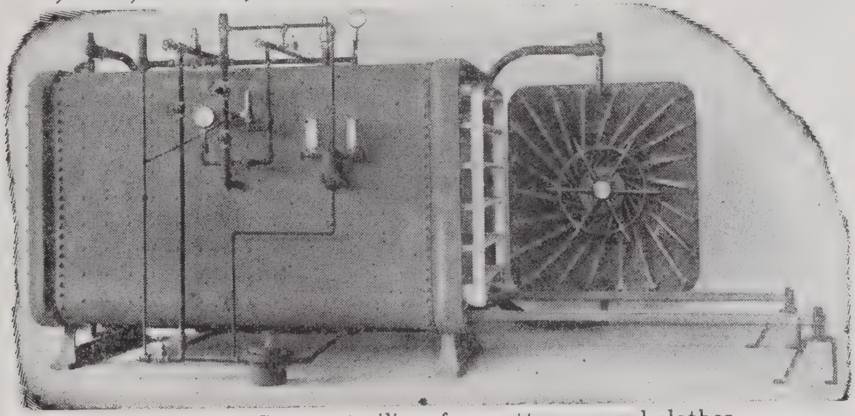


Fig. 155.—Steam sterilizer for mattresses and clothes.

For mattresses, pillows, or clothing that cannot be washed, the sterilizer, called a disinfector, is stationary and is constructed like an oven (Fig. 155). Thus the mattresses can be sterilized without the use of soap and water.

The sterilizer is usually placed in a small room adjoining the washroom, if not between the wards and the laundry. This is preferable because clothes that need sterilizing should not be mixed with clothes that are clean and free from contagion, or that are only soiled. In hospitals that give special care to contagious diseases, the sterilizer is set lengthwise into a glass partition. This partition of glass is of the wire type such as is used in fire doors. The washer stands built into the partition, with one side in the room for the non-disinfected clothes, and the other side in the clean clothes room. Such a washer has two outer openings, so the clothes are in no way allowed to mix.

Soap Tanks.—For good routing the soap tank should be in close relationship to the washing machine (Fig. 33). It should be fitted with steam attachments to make heating possible. (See Fig. 156.) The faucet needs to be large to permit of the free flowing of soap solution. Soap tanks may be used as soap cookers (p. 101), in which case they should be constructed with round bottoms. When the steam is turned on, there will be more even pressure than with a flat-bottomed tank, with less chance of the bottom being forced. There will also be less noise from pounding steam.

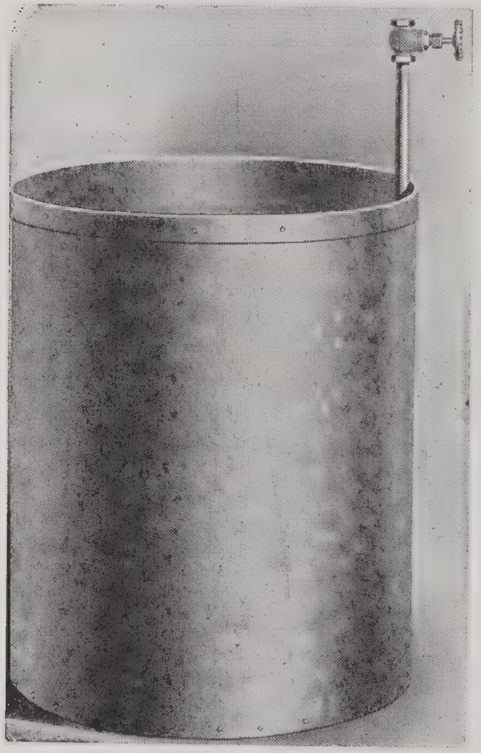


Fig. 156.—Soap cooker.

Water Softeners.—In localities where the water is hard, devices for softening the water are the greatest kind of an economy. The hardness of water is not always realized, or is not given its due share of blame for unsatisfactory laundry work. (See p. 124.) But hard water causes a deposit in the pipes, in the washer, and in the boiler—and too often on the clothes themselves. This condition necessitates the use of more soap and soda, the readjustment of wash formulas, and often rewashing to remove the lime soap deposit on the clothes. One authority states that for every degree of hardness there is a theoretical soap waste of 1.3 pounds per thousand gallons. And in certain parts of the country water of 20-30 degrees of hardness is not uncommon. A test, covering samples of water ranging from 3.5 to 20 grains of hardness per gallon, gives the startling results that when water of " zero " hardness is used, there is an average saving of 66 per cent. of soap and 74 per cent. of soda, as well as 36 per cent. of water. Obviously, the savings would be less where the water is naturally soft, and more when it is very hard. These expenses would be eliminated by the use of a water softener to remove the objectionable material before the water is used for washing. So, although the first cost of a water softener may seem high, in the long run the saving in supplies and the improved results may more than balance such cost.

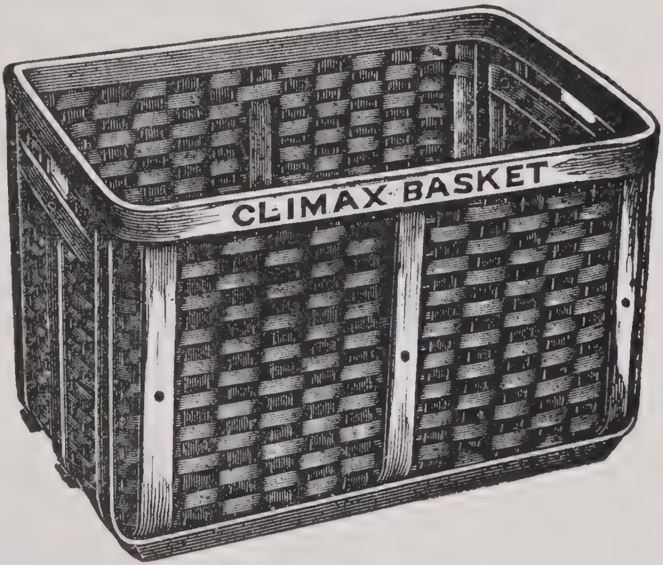


Fig. 157.—Basket.

There are many types of water softeners on the market, and each is suited to some peculiarity of water hardness. One of the first means of eliminating impurities was the "slow sand" filter. Other developments were lime and soda-ash softeners, and various compounds to be used in boilers. One of the most recent developments is the use of a softener called a zeolite, which is itself insoluble in water. It is a very effective softener for laundry work, and can be regenerated and used over and over. There are, in addition to these agents, softeners designed to remove certain special minerals from the water. The laundry supervisor who is considering the installation of a water softener should investigate all types, and should have a sample of the water tested, in order to be able to choose the softener best suited to the needs of the plant.

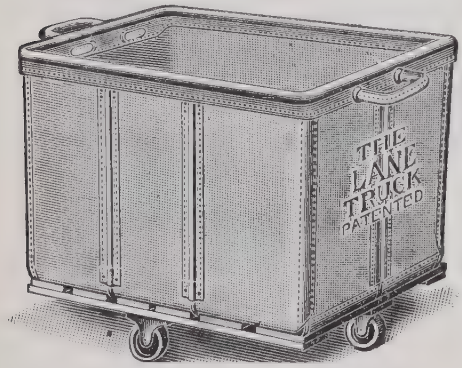


Fig. 158.—Canvas truck.

Baskets and Trucks.—Both baskets and trucks are necessary pieces of equipment, because they bring about so much quick handling and protect the clothing in transit about the laundry. No linen should be dragged on the floor. Baskets may be of wicker, but it is better to have them of split wood or of canvas (Figs. 157-159). The canvas baskets are light and durable. They can be painted with two or three coats of enamel paint to make them non-absorbent and easily cleaned. All baskets are put on a wooden base to prevent wear, and such a base makes it possible to have truck wheels, which add to the ease of moving the baskets. The differentiation between baskets and trucks is according to use rather than to structure. The dry work usually is put into baskets, and the wet clothes into trucks. Trucks for wet clothes may be of canvas, of papier-maché, or of galvanized iron.

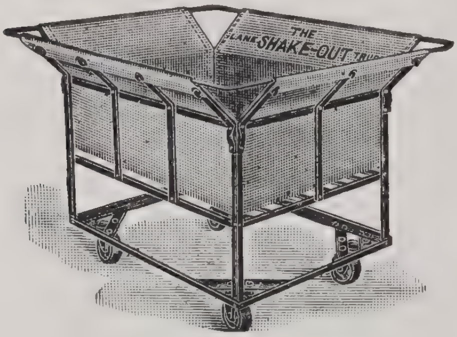


Fig. 159.—Shake-out truck.

No matter whether baskets or wooden or metal trucks are used, it is essential that they be on rollers large enough to make the trucking easy. The front or guide wheel, or wheels, should be a swivel roller. If the rolls are of hard rubber, the noise and the wear on the floor will be reduced. Halls should be planned large enough for the easy passage of all trucks; in very large institutions the halls should permit the quick and easy operating of an electric truck.

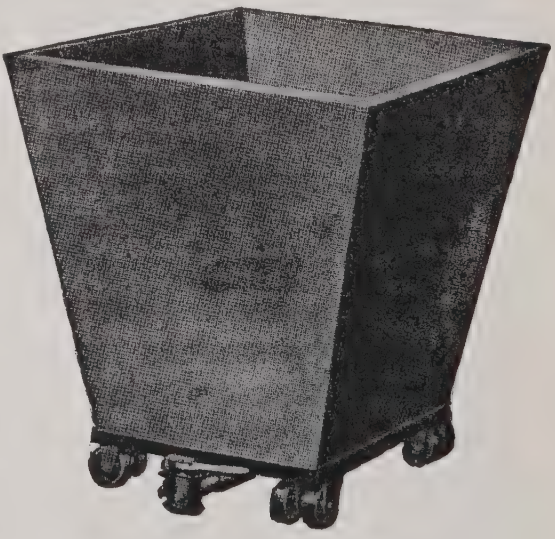


Fig. 160.—Wooden truck tub.

Truck Tubs are usually of wood (Fig. 160). They are made with a wooden drain which empties into a metal-lined bottom; this is equipped with a drain faucet. Such a truck tub is used in taking the water-soaked clothes from the wash wheel to the extractor. A square or oblong truck will take up more room than will a round one, but it is more efficient because its straight line may come in close contact with the washer. On account of this there is less chance for spilling. All such advantages should be considered in buying equipment, for definite thought should be given to having a dry workroom floor.

Laundry Nets.—Nets can be used for collecting soiled clothes, for bundle washing, and for washing of delicate fabrics. For bundle work the nets reduce the handling, the marking and sorting into lots. For fine work they act as a protection to lace, fringe, or delicate garments as a whole. As suggested in the chapter on

Colored Clothes (p. 156), the nets are helpful in the washing of colored goods. In this work each net holds garments of one shade of color, and the thickness of the cord does much to prevent one color from bleeding directly on to another. Handkerchiefs and collars are washed in nets to reduce handling.

Nets vary in size and in the heaviness of the cord (Fig. 161). For women's fine work the small, light net should be bought, because the net has a small capacity and will not be heavy and such a drag on the bundle.

Marking Pins.—Pins of a special kind are used for marking bundles (Fig. 162A), as in rough-dry work, or for marking special pieces which are to have an individual care. The pins are like safety pins, with a number on the head of each. These pins are held in metal trays which contain thirty or thirty-five pins, and because the pin is not closed, it never falls out of the rack. Each bundle has a number—say 35—and as long as pin tray No. 35 is short a pin, some garment is still unaccounted for. If a pin was in each net or on each garment as sent to the washer, when the clothing is checked this will be indicated by a tray refilled with its complete quota of pins. This method of marking is used chiefly for bundle work. Fig. 163 shows method of pinning rough-dry work.

Tags for Marking.—These tags are made of soft zinc, cloth covered. On the cloth the ink mark can be written, and then by a quick pressure of the small prongs or teeth, the mark is attached (Fig. 162B). Such tags are used for stockings, for knit underwear, and for overalls.

All laundry needs, like equipment or supplies, may be contracted for through a laundry-supply house. These supply houses supply in quantity such things as collar buttons, tapes, underwear buttons, ink, blue, felts, padding, muslins, measures, shapers, nets, and supplies for special laundry needs. Each supervisor should have the catalogue of various firms, and purchasing should be done on contracts based on a standard dictated by the intelligent buyer. Often supplies that are new for the supervisor should be tested before being purchased, and samples are obtainable for this work. Every recognized supply house will help with recipes and with formulas for their goods. These can be easily modified to suit the special work of each institution. The testing of supplies would

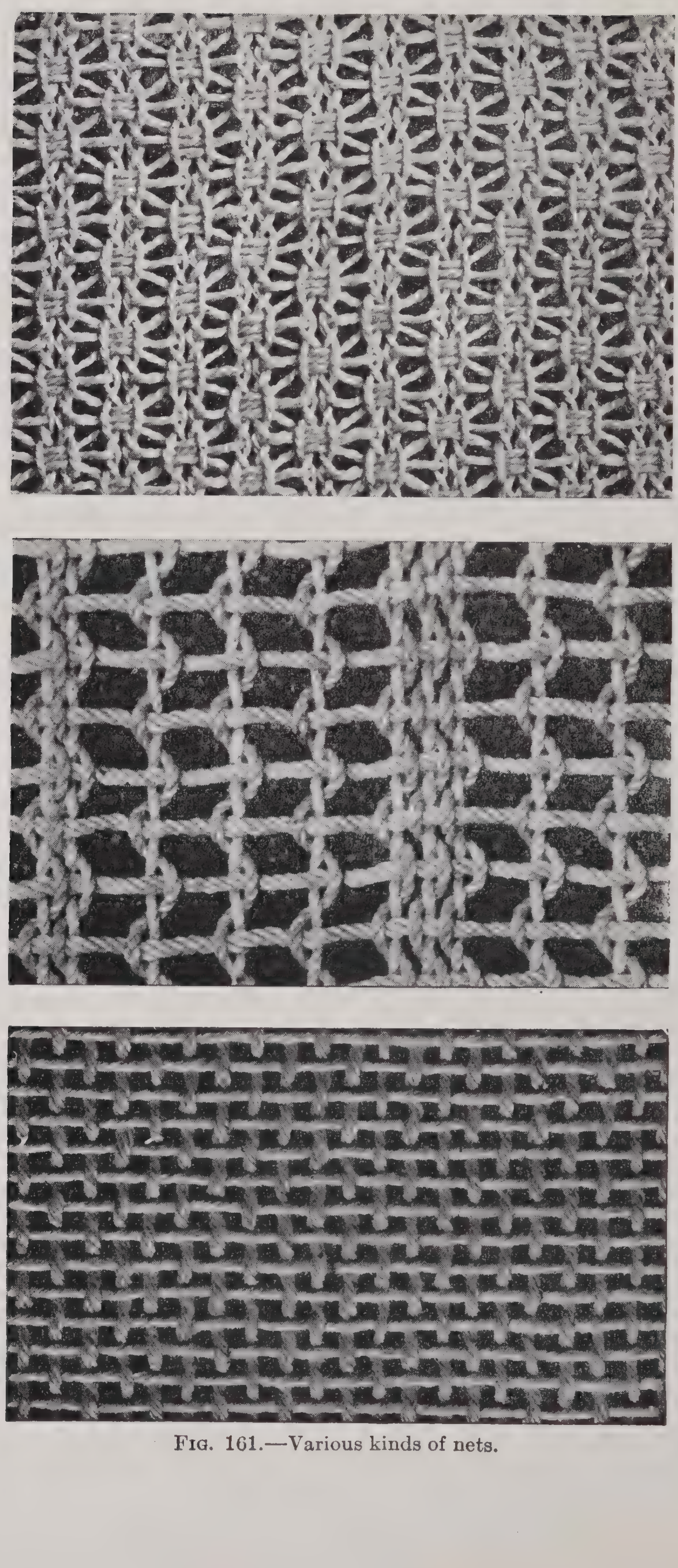


Fig. 161.—Various kinds of nets.

be done by using the formula as directed by the manufacturer, repeating its use many times, and observing closely its results. If there seems to be a fault somewhere, careful tests should show whether or not it is the supply that is at fault. Of course all such testing, to be fair to the manufacturer as well as to the laundry supervisor, must be accurate and must be considered from all sides. This calls for broad-mindedness on the part of the supervisor, and he will be amply repaid for his work by better results in all departments of the laundry.

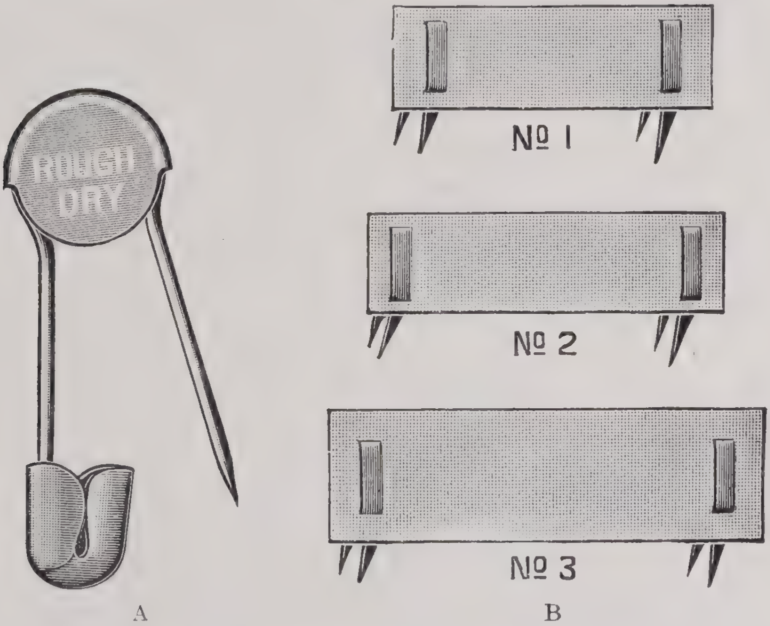
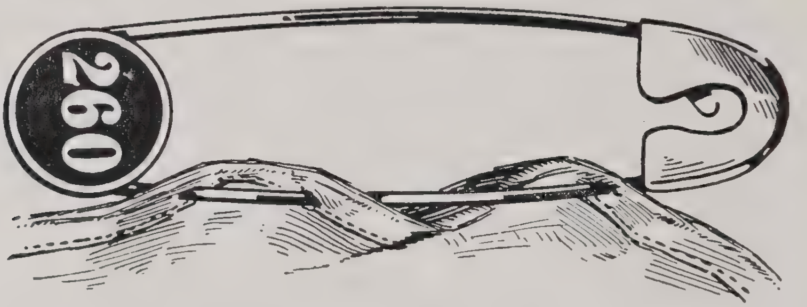


Fig. 162.—Marking pins and tags.

MAINTENANCE OF EQUIPMENT

Care of Equipment.—Laundry machinery is, as we have seen, expensive at first cost; therefore it should be the duty of the supervisor to see that it has the special care necessary to keep it in first-class working condition. The first care is a daily upkeep through cleanliness, frequent oiling to prevent unnecessary wear, and thorough inspection to prevent bolts, screws, and belts from wearing or loosening. If the laundry has a shaft, belt-driven equipment, the cleaning of the shafting and cage protection adds much to the work of supervision. Belts will need to be cleaned, dressed, and watched to see that power is not being wasted by running these belts loose.

The laundry which is operated by a licensed engineer wash man works to advantage, because the trained and experienced man is always at hand and should be able to discern quickly the needs of the plant. If the engineer is a man in the plant with general supervision of all engines, dynamos, plumbing, and even repairs, then the care of the laundry machinery falls to the department supervisor. Many little readjustments may be made by the supervisor, but the engineer must be on call for quick repairs. A laundry department operated by a woman would be benefited by having a licensed engineer as a wash man. The training of such a man is possible through apprentice work and in many of the schools where the mechanics of laundry machinery and operation is being taught in night school.



Redrawn from American Outlook.

Fig. 163.—Method of pinning rough dry work.

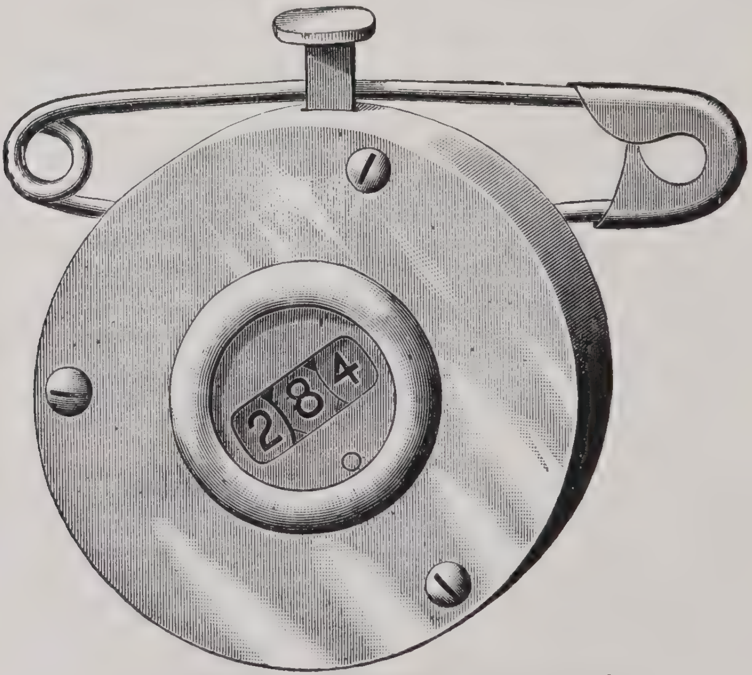


Fig. 164.—Worker's counter for piece work.

One could hardly expect an engineer of the plant to be free to start the machinery and the heat early in the morning, so the laundry supervisor must accept that responsibility. On all machines except flat-work ironers and collar and cuff ironers, the by-pass is opened, the valve "cracked," then the by-pass closed, and the steam turned on slowly. On the ironers mentioned, the by-pass is opened, the machine started so as to empty the water of condensation from previous coolings, and to insure even heating by not having a block of water against the incoming steam. Steam cannot pass a dam of water. To turn a quantity of steam suddenly into a cold cylinder is a risk, so let the steam in very slowly with the machine in action. If the water is all out, the steam will soon warm the steel cylinder at the end farthest from the inflow of steam. If it does not, the by-pass is not working, and should be cared for.

Rules for Care.—Every machine presents its own special problems in care and upkeep, because some have harder wear than others, while some introduce a degree of danger to the worker, all of which makes the expense of upkeep great.

WASHERS: Washers are oiled once a day.
Inner cylinders are cleaned when coated, about once or twice a month. See p. 82.
Keep glass gauge clean, that it may register evenly.

WASHTUBS: These should be kept clean, with faucets bright.
Clean enamel with kerosene; some of the same solution that cleans the washer will clean the faucets.
Clean all lint from the trap.

EXTRACTORS: Wash and keep free from lint.
Each night, or whenever the plant is not at work, cover extractor with a cloth.
Oil the machine.
Keep the belt clean, and be sure that the basket runs on an even pivot.

TUMBLERS: Cold tumblers are like washing machines, and need the same care.
Drying tumblers need oiling twice a day if in constant use.
If suction blower does not take up all lint, use a hand bellows. This lint must be removed, or it will fall back on the clothes in the tumbler and get into the other machines, especially the ironer.

Driers and Conveyors: Hose out the driers once a week.

Keep the steam pipes clean.

Be sure the trolleys are oiled, and the bars wiped clean.

Flat-work Ironers: The ironer should be free from lint. Brush each day with a whisk broom.

Muslin covers should be changed often enough to insure cleanliness—about once a week.

Wool felts should be refelted about once a month. It is an economy of time to have two sets of padding.

All heated parts should be oiled twice a day with cylinder oil, all unheated parts with engine oil. The stuffed bearing boxes will allow the oil to seep down gradually. As often as the box stuffing stops oozing oil, add more oil.

Shut off steam ten minutes before closing time.

Remove all pressure when ironer is not in use.

Ironing Machines and Presses: Change covers once a week.

Oil machines once a day when in use.

Ironing Tables: Keep muslins clean. Change about once a week.

Electrical Equipment: Inspect motors each morning. Oil once a week.

Clean once a month by removing all oil and cleaning with kerosene, then re-oil.

Keep electric fans oiled and clean.

Examine electric cords carefully to prevent an exposed wire from making a spark. Wind every small break with mending tape.

Establish electric irons with safety light attachment and with iron standards.

Cleaning the Room: The place should be clean. Make it so by any method necessary for the work.

Every inch of floor should be swept every day. This is often done by dividing the work, each worker being responsible for his particular section of the floor. Vacuum cleaners may be used with good results.

Scrub floors once a week.
Keep windows clean.
Wipe down walls.
Remember that dirt hinders the degree of efficiency in a laundry.

Rules for Operating Machinery:

WASHER: Set brake for loading and unloading.
Open clothes as they are thrown into the machine.
Empty all soiled water before refilling machine.
Empty clothes from washer by drawing carefully from top. This will prevent tearing.
Leave washer empty and clean, and open to dry.

EXTRACTOR: Pack linen evenly around the central pivot.
Tuck in all loose ends, and allow no parts to be drawn across the basket.
Use a heavy cover cloth to prevent garments from flying out.
Never touch extractor when it is in motion.
Always use safety covers.

IRONER: Put in motion.
See that valve nearest trap is open.
Turn steam on *slowly.*
Watch aprons carefully; report uneven work.
If any piece of linen is caught on rolls, never try to remove it with machine in action.
Loosen pressure on rolls when not in use.
Do not clean with machine in action.
Turn off steam ten minutes before closing time.

COLLAR MACHINES: Put in action.
Turn on steam slowly, with return valve open.
Turn off steam ten minutes before closing time.

GAS MACHINES: Watch flame and regulate from a distance.
It is not safe to let one person regulate air and another gas.
Turn off gas first, blower second. If blower accidentally stops, turn off gas at once.

Safety Rules to be Followed to Avoid Danger:

1. Clean no machine, except wash wheel, when it is in motion.
2. Set brake before loading and unloading washers and tumblers.

3. Never touch an extractor when it is in action. Always use safety covers.
4. Shut off gas, then blower. If blower stops, turn out gas immediately.
5. Regulate your own supply of gas and air. While you watch flame, hold face away.
6. Stop machine if goods is caught. Never take out with machine in action.
7. Do not touch a starch kettle, extractor, press, or body machine unless thoroughly familiar with it, as they must be regulated with care.
8. Elevators must not be operated by untrained employees.
9. Motors must not be cleaned except by those especially trained.
10. Do not touch electric fans when they are in motion.
11. Do not enter switch-board cage.
12. Do not comb hair near electric fans or revolving machines.
13. Do not smoke in laundry.
14. Do not throw burnt matches on the floor.
15. At night before leaving—
    Shut off all steam, gas, and electricity.
    Close all windows.
    Leave warm irons on iron stands.

Questions

1. After you have drawn the building plan (Chapter XXI), arrange the machines—washer, extractor, 8-roll ironer and press, to have greatest saving and greatest production.
2. To what extent do you consider it a wise combination to have a wash man act as engineer?
3. What machines do you feel you could do without and still carry all processes of the work?
4. If you were serving a dormitory, would you have a flat-work ironer that could do body clothes as well as flat goods?
5. Problem: Given a barn in a rural community, with some fifty families in a radius of ten miles, outline your method of procedure to set up a practical community plant that would not involve excessive cost.

CHAPTER XXIII

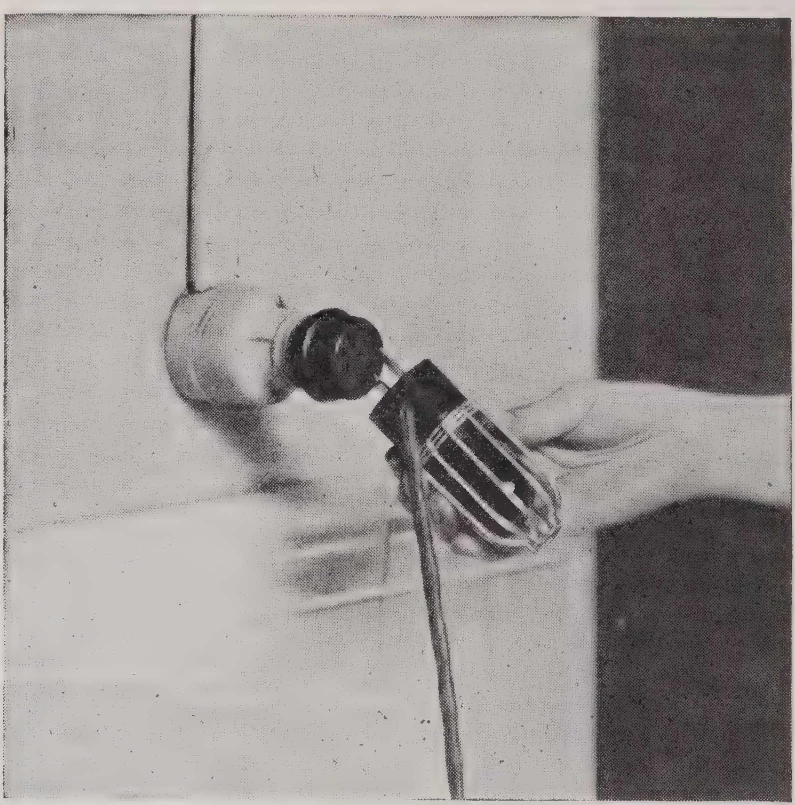
ADMINISTRATION OF THE INSTITUTION LAUNDRY

THE laundry of an institution is apt to suffer from poor organization. Like the kitchen, it must be operated regardless of its financial returns, for it is a sanitary and economic necessity. As a result, it is often allowed to be run on make-shift methods, and is uninspected by the institution manager unless there is a serious breakdown in the work. Good organization and regular inspection will put the laundry on a real business basis, so that there will be maximum production and minimum waste.

In small hotels, club houses, private schools, and some small hospitals where work is quite limited, the soiled linen may profitably be sent to a commercial laundry. This is a saving in small plants where the residence comprises less than fifty beds. One reason for this is that many small institutions have been established in houses which are often remodeled homes, and to introduce machinery means also the extra cost of bracing floors, and perhaps remaking halls and entrances if the building is to remain the same. In the end the place is often too small, and the whole plant is likely to be handicapped by the noise, odor, steam, and bad ventilation. It is extremely hard to place the equipment properly in cramped quarters, and without this and other necessities of organization even a small plant is likely to be sadly inefficient. In addition to this, an institution of less than fifty beds is not likely to have enough laundry work to give an adequate return on the investment in equipment and wages.

In an institution larger than this, it may be more satisfactory to operate a laundry. If the linen is used on the two-lot system, for example, there probably will be less delay in returning the clean linen than if an outside laundry is patronized. Also, if emergencies arise, such as an accident or an epidemic, it is very necessary to have the clean linen available with the least possible delay. A study of comparative costs usually shows a saving in favor of the institution laundry provided there is enough work. If the laundry of a large institution does not seem to be turning out as much work as it could, it is sometimes possible to earn a little extra money by contract work for smaller institutions. This arrangement, if well planned, effects a saving for both institutions.

Legal Standards.—The very first, and an ever-present, problem that the supervisor meets in the organization and administration of his plant is the legal standards set up by the city or state regarding wages, hours of labor, safety and health, and insurance.



Courtesy of Good Housekeeping Institute.

FIG. 165.—One type of safety connection for electric machines.

These laws vary in different states, but nearly every state has some regulations which apply to laundries because, technically speaking, a laundry is a factory. Copies of these laws are distributed by the State Department of Labor or by the City Commissioners. The head of any laundry should be conversant with all the rules and mark any parts which could in any way influence his operation of such a plant or control the management of employees. In some cities even to establish a community laundry or wash house requires a license. In others the applicant for a license must pass an examination before the Police Bureau of Licenses.

BUILDING REGULATIONS include many points that apply to the establishment of laundries. If the laundry is to occupy a rented building, for instance, the lease must be checked against these regulations, and also against Board of Health rules, fire ordinances, and sometimes the Housing Commission rules.

Safety Regulations cover not only the building itself, but its equipment and operation as well. The employer must provide a reasonably safe work-place. This means that all belting, shafting and gearing must be guarded, that machines be equipped with safety devices. In some states there is a penalty for the removal of these devices. Some states require the use of devices for the automatic stopping of machines when necessary; Illinois requires, in addition to these devices, some means of communication between work room and engine room, such as electric bells, lights, or speaking tubes. The law says that no employee may operate a machine unless he is familiar with it, and unless it is related to his particular duties. Therefore, every worker should have an understudy—

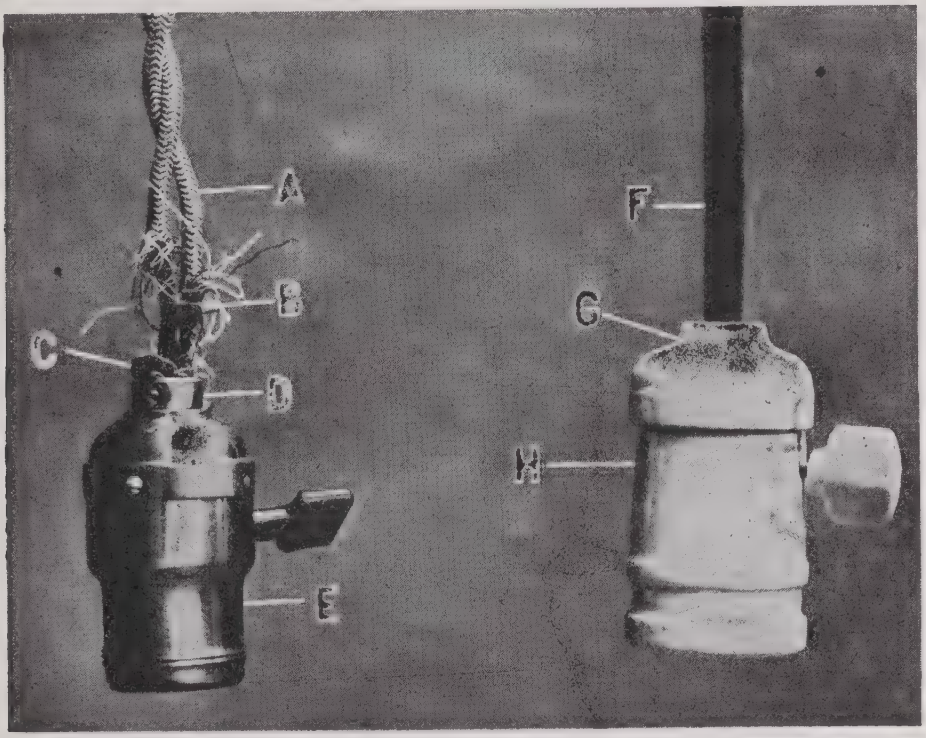
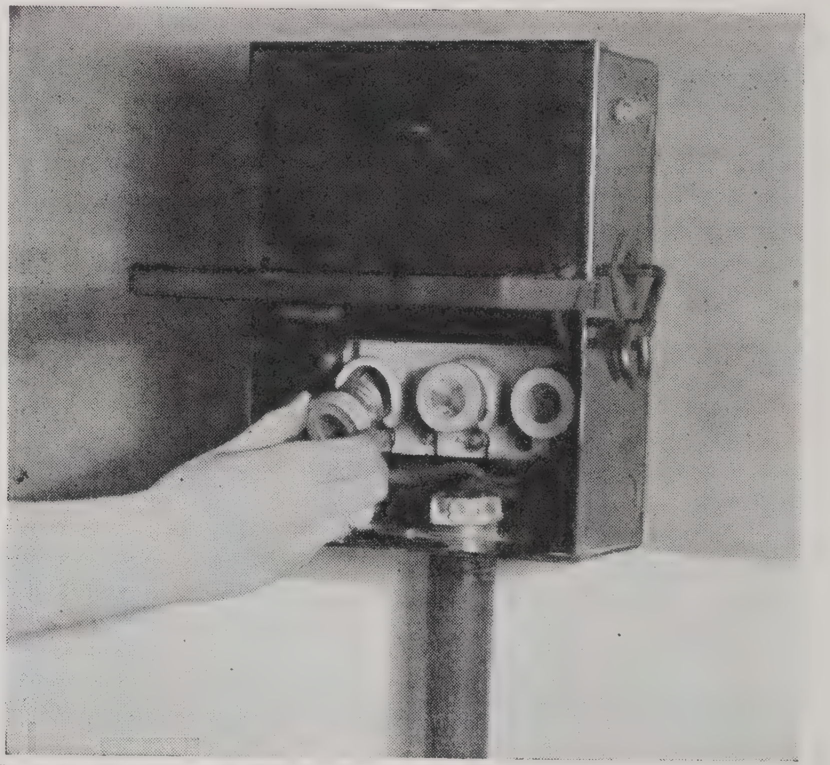


Fig. 166.—Examples of bad and good methods used in portable lighting.

Note the broken bushing at C in the brass socket E, exposing the nonreinforced lamp cord A abraded at B, by the cutting edges of the brass threads in the neck of the socket D, injuring the insulation and exposing the live wire in contact with the metal socket. A person using the socket may receive a shock. A nonabsorptive insulating socket, such as the porcelain one H, which is shown wired with reinforced lamp cord F, will insure adequate protection to the cord by the rounded neck G and to the user.

someone who is trained to take his place in an emergency. Some states require that no machinery be cleaned or repaired when it is in motion. No matter whether the state requires it or not, however, this is a splendid habit to form. Other requirements are that stairs must be guarded by proper treads and hand rails, elevators must have automatic catches to prevent falling, steam boilers must be protected to prevent explosions.



Courtesy of Good Housekeeping Institute.

FIG. 167.—Replacing a blown fuse.

FIRE REGULATIONS are worked out in considerable detail in most states. For instance, some codes stipulate cans for combustible waste, a daily sweeping of floors, all gas jets enclosed, automatic gas shut-off cocks on the exterior of the building for use in case of fire, and such local apparatus as pails of water or sand in accessible places, standpipe and hose, fire extinguishers, or automatic sprinkling devices. Fire escapes must be adequate and accessible, with doors opening outward, and be designated by means of colored lights.

Fire insurance is carried, or should be carried, by every institution. This may take the form of insurance in standard fire companies, or it may be self-insurance such as is used in the textile industry. This latter form, in which the employer sets aside a fund for fire insurance, is very practical, for it serves as an incentive to the development of safety rules and devices. It thus operates both as a cure and a preventive.

Health Laws vary in many states, some having advanced much farther in such legislation than others. As one step toward controlling the health of certain trades, studies have been made by welfare organizations, factories through clinics, and by employers themselves to determine the extent to which occupational diseases are a menace. Laundry work has been referred to constantly, without reason in most part, as a trade in which workers are subjected to diseases, especially of a contagious character. After special study we stress the statement "without reason," for it is very interesting and conclusive in reading research studies from factories where laundering is a process, and from health organizations, to find that the "disease" which heads the list is fatigue due to humidity. Fatigue in itself is not especially characteristic of the laundry business any more than of any occupation. It is the presence, in poorly established laundries, of excessive heat and moisture that increases the bad effects of fatigue and causes the real exhaustion. It is significant of the general attitude toward this problem that only two states, Massachusetts and Illinois, have legislated concerning the control of excessive humidity.

Of course, cumulative fatigue may develop into disease, and it should be prevented by every possible means. It is often the indirect cause of accidents, as it produces a relaxation of muscles and a dulling of the mind that cause neglect of proper precautions. Fatigue may be caused not only by humidity, but by a number of other contributing evils, such as poor light, poor ventilation, over-crowded workrooms, hard floors, low working surfaces, unsuitable clothing and shoes.

It certainly is true that factories in general could benefit by an inspection for light and ventilation. Light should be clear, like daylight, and free from the irritation of glare. The problem of lighting has had much less attention than it should in spite of the fact that physicians estimate eighty to ninety per cent. of headaches to be due to eyestrain, in which poor lighting is a big factor.

But even though the employer finds no legislation on this point, he is not absolved from responsibility in the matter. Efficient work demands good working conditions, regardless of laws or rules.

Ventilation includes both the control of humidity and the supplying of abundant fresh, clean air. Every machine should be covered with a hood to take up gases, heat, and moisture as soon as produced. Everything should be done to free the laundry from dust and lint. This may be done by means of blowers and suction fans, and in some laundries vacuum cleaners have been used with very good results. There should be an abundant supply of fresh air from outside, and the room should not be so crowded with machines and operators that it is impossible for each worker to receive his proper share of air.

Hard floors and low working surfaces, which have been discussed elsewhere, are very potent causes of fatigue. Hard floors can be remedied by cork mats. Low working surfaces have no remedy except alteration to suit the heights of the workers. Continued standing in one position is also very fatiguing, and the thoughtful supervisor will ameliorate this by providing stools which may be used in leisure moments.

The question of suitable clothing and shoes is one that needs serious consideration. It is not exaggerating the truth to say that many workers contract colds and more serious illnesses from having to wear home the same clothing in which they have worked all day. The manager who wishes to raise the standard of his laundry, as well as to consider the health of his employees, will see that every employee has a washable working uniform, a locker, and the use of a dressing room where he may change from one set of clothing to the other. Better care will probably be taken of the uniforms if the employees buy them themselves. It is quite possible to plan a scheme of payment that will work hardship to no one. If one is considering every safety precaution, he will no doubt wish to add caps to the uniform. These prevent the hair from falling down and becoming entangled in the machines. Together with uniforms should go sensible working shoes, with rubber heels.

Contagious diseases may be contracted in laundries as well as elsewhere, therefore some states have regulations concerning the examination of every prospective employee and the exclusion of all who are suffering from such diseases. Infectious diseases must be cared for promptly, if they are to be prevented from becoming a menace to the health of the worker. To this end some states require that a first-aid kit be part of the equipment, and that there be someone on duty who can care for every scratch or cut as soon as it is made.

LABOR LAWS concerning minimum wages and hours of labor have a direct bearing upon the dealings of the supervisor with his employees. A thorough understanding of the requirements and restrictions of these laws will help to prevent many unpleasant disagreements with the employees.

The minimum wage for women (now unconstitutional in one form) exists in several states. There is no such law for men, partly because they tend to establish wages through trade unions. The questions of wages involves, of course, many considerations. While the law has made it compulsory to pay at least the stated wage, it is not expected that employers will take advantage of this opportunity to keep wages at this low point, because the minimum wage provides for only a mere existence. Obviously a worker living on such a narrow margin cannot give his maximum service to the laundry. A far-sighted employer will adjust the wages so that his workers may be insured safety and health.

Hours of labor go hand in hand with adjusted wages to make conditions favorable to maximum production. Legislators throughout the country have realized the necessity of limiting the hours which a worker may spend at his job. Nearly every state has regulations concerning the hours of labor of women; most states limit them to eight or nine per day, less than sixty per week. There is also a tendency to eliminate overtime work. Some states require that legible notices be posted in prominent places, stating definitely the hours of work. In addition, employers may have to keep a record book containing the actual hours given by each woman each day, this book to be open to inspection by the authorities. Night work for women has been forbidden in a few states, but by no means all. In the United States annual vacations on pay are compulsory only for public employees. But here, again, the intelligent employer will realize that he can well afford to be ahead of the law in granting vacations on pay, for in the long run the work will benefit.

SOCIAL INSURANCE as a means of distribution of losses is receiving more and more attention. It is good for both employer and employee, because it not only distributes losses, but tends to encourage the elimination of risks. So far compulsory accident insurance has alone been adopted, and this is now the rule in most states. Compulsory health insurance, in which the worker, employer, and sometimes the state share, is a proposed regulation, but is not yet law. It would seem that the employer might well adopt some such system to further health conservation. In connection with the mutual insurance program, the employer should make it possible for the employees to receive medical aid at a cost they can afford.

The Supervisor.—As has been stated in Chapter XXI, it will be found a saving in the long run to have a separate building for the laundry. However, if the laundry must occupy a part of the main building, then there must be careful organization and administration, in order that the institution may not be in any way handicapped.

The success with which this organization is accomplished depends in large measure upon the supervisor. Especially in small communities, where there is apt to be a lack of legal supervision, the institution laundry needs a thoroughly wide-awake man. The laundry suffers more through the ignorance and inadaptability of its head man than from any other cause. He must know his business—or know where to find out about it—and must have the vision of his achievement. In other words, he must have definite standards, and a determination to realize them. This does not mean that his ideas are to be the sole governors of the plant. He must be ready to discard the old if the new is better, and to make intelligent use of the equipment he has. Not every supervisor is fortunate enough to step into a new plant, made to his liking, for a great many must cope with inadequate equipment and untrained labor. The supervisor who can do this, and still have an organized, efficient laundry, is the successful one. The inexperienced manager can secure much help from laundry machinery manufacturers and laundry-supply houses, as well as from the Laundrymen's Association, its meetings and its publications. Membership in this association carries with it the privilege of receiving personal help from experts designated by the organization. In this way a manager may have definite aid in straightening out his difficulties.

The Workers.—The organization and supervision of the employees in a laundry involve several important problems. Every institution is a world in itself and must be controlled by definite rules which apply to the needs of that special organization. As stated above, the operation and management of the plant must conform to state or city regulations. But in addition to this, there is a most significant factor in the success or failure of the management of employees—that is, the personal relations between the supervisor and his workers. The modern ideas of factory control include the study of man power, labor saving, time and motion study. The wide-awake manager will reach out after all of these ideas that will help him to understand better the psychology of his employees and to raise the standard of his plant. He cannot, of course, work out innovations by himself, but must be able to count upon the coöperation of his workers. Therefore his selection of workers and his subsequent attitude toward them will largely determine the limits of progress in the realization of his plans for the laundry work.

THE PERSONNEL of the laundry workers will influence the quality of the work turned out. Cheap labor may in the long run prove to be expensive labor, and a careless worker may have a bad influence over the whole laundry. A worker that is too old or in poor health will not be able to do the best work, while a worker who brings disease to the laundry will, of course, demoralize the whole plant. So the supervisor will be wise to choose carefully his workers, trained if he can get them, but surely such as are capable of being trained. They should feel from the start an interest in the work and a sense of companionship with fellow workers. The welfare worker, where employed in large plants, does a great deal to bring about a good attitude on the part of employees, but the supervisor in the ordinary institution laundry must be welfare worker as well, and the careful selection of workers will be the first step toward a congenial group. Modern management makes over men to a considerable extent, and especially tries out the misfit employee at other tasks, in the hope of finding a place where his qualities will fit him for more useful service. Discharge is usually handled by the head alone, or in large plants by his personnel worker.

THE WORKING FORCE will be determined by the size of the institution, and the amount and kind of work done. The allowance of one worker to fifty beds is a good one as a starting point. If there is much hand work done, this allowance may have to be increased. In most institutions some parts of the week are heavier than others, and it may be a good plan to have part-time workers who come in during this part of the week. This is better than to maintain too large a regular force. One worker can handle two wash wheels or two press ironers. The size and kind of the flat-work ironer will decide whether there shall be two or four operators. It is not wise to have too few workers, so that machines must stand idle for lack of an operator, but neither must an operator be idle for lack of a machine. (See p. 263.) In this problem of estimating the size of the force, laundry machine manufacturers can be of help with definite statements as to the amount of work a given machine can do in a day. This serves as a check-up for the supervisor, as to whether or not he is getting maximum production from his plant.

Rules for Employees.—Many misunderstandings will be saved by clear-cut contracts signed by both employee and employer, and by definite, printed rules concerning the duties and privileges of employees. These rules should not be so severe as to be restrictions of legitimate privileges. They should be formulated with a view to securing good organization for the plant as a whole and good attitudes on the part of the workers. The rules given in Chapter XXII for the operation of machinery are most important for the employees to learn. And the safety rules also given there cannot be too strongly emphasized. The prospective employee should be made to understand before he signs his contract that he must obey these rules. It would not be too severe to rule that any employee who habitually breaks them shall be dismissed. In addition to these rules, there should be rules of behavior, that the employee may know just what is expected of him. The following may be suggestive:

Rules for Employees:

1. Report on time.
2. Change street clothes for washable work clothes.
3. Use lockers and keep them clean.
4. Eat lunches in the place supplied for this purpose.
5. Have no visitors—an emergency call can be arranged at the office.
6. Do no smoking or chewing.
7. Make no unnecessary noise.
8. Your time belongs to the institution—don't waste it.
9. Any washing done for you is an exchange privilege—cleanliness for the work and for the worker.
10. Uniforms will be kept clean by the management.
11. Leave the laundry in good condition at night.
12. Bring criticisms or complaints to the supervisor—don't make

> secret grudges of them. Be alive to your job—helpful suggestions will be welcomed.

The worker should appreciate that his time belongs to the institution, and that he is expected to give value received for his pay. All employees should be discouraged from holding secret grudges, or from idle discussions among themselves that tend to breed dissatisfaction and unrest. They should be encouraged to bring legitimate complaints and criticisms directly to the manager, who can usually straighten matters out if he is tactful. If the workers are organized, with a leader, then that leader should feel the responsibility of open and fair dealing with the management. The supervisor, on the other hand, must also be fair and open-minded, and ready to act upon constructive suggestions. He will do well to encourage the workers to feel free to make helpful suggestions, to give them credit for every bit of original thinking they may do. In some places payment for suggestions has been used successfully. It is a good plan to have regular meetings, say once a week, in which the supervisor meets his employees on a basis of coöperation and mutual helpfulness. At these meetings the employees will have an opportunity to talk out criticisms and suggestions, and this should engender a spirit of loyalty and enthusiasm for maintaining high standards of work.

The workers should not be made to feel that all the rules are for them, but that there is a two-sided bargain. If they are expected to obey all the rules laid down for them, they should be assured that the employer, on his part, has pledged himself concerning such points as good working conditions, rest periods, and vacations on pay. Such coöperation between supervisor and employees will do much to raise the standard of the laundry and the quality of the work done.

THE WELFARE WORKER is considered an essential part of most large factory organizations. By those who have made no study of welfare work, it might be called a " soft pedal," as it were, to the trade. Everyone who has been interested in the results of such work, or who has seen the effect on the workers, withdraws the first suggestion that savors of criticism, and usually decides in favor of the so-called " social work." Welfare work is a sane following of the golden rule—make a man better by intelligent and coöperative supervision, and by hygienic surroundings, kindness, praise, and education for a particular part of the job. Then, if these ways fail, it seems quite evident that the employee needs to find an entirely different field, and the employer has not lost a perfectly good man through failure to make the most of him.

The welfare worker aims to help both employer and employee by establishing mutual understanding. The worker can do this if she knows well both the employer and the individual employees. This understanding of employees may be brought about by coming to know them personally in the establishment, and where need opens the way by friendly visits to their homes. Helpful suggestions may often be given as to ways and means for better nourishment; the establishment of some of the modern plans whereby a rest period is inaugurated; the extending of the service of the employer by such means as supervising the shoes worn at work, or making it possible for teeth and eyes to be examined at a cost that is within the range of all. The factory in many places becomes the social center of the employees; bowling alley, swimming pool, dancing, debates, and all the branches of club life are possible. Pins like society pins are a sign of membership, and in some cases the numeral suspended is a proud acknowledgment of years of service. In many factories the employees are given help in night school to learn English and to become acquainted with the customs of America, and extensive educational programs are often developed.

Organization of Work.—THE SYSTEM of the laundry department of an institution depends upon the schedule of work. The first step toward sorting the linen is made by creating a plan of work which cares for the work of each day, each floor, or each building. Thus, officers' work is consigned to a special day; nurses or faculty, patients or residents, have other days; and employees, maids or porters with special uniforms, cooks, waiters, and chambermaids have still another time. The laundry usually plans to do the laundry work of the employees in its own department, whether or not they live in the institution. The flat work, for example like that of the regular hospital wards, together with linen from the operating room, is considered as a part of every day's wash or the regular work. Many institutions prefer to work on a three-lot system—one set of linen in the laundry, one in service, and one in reserve. Another way, especially successful with the previously suggested way of checking the linen (pp. 70, 71), is to operate on a two-lot system—one set of linen in use and one in the laundry. Such a system, however, allows for no emergencies, such as very frequently must be met by hospitals.

Therefore, it is probably wise to compromise between the two systems, by using a two and one-half lot system. This allows for one lot in service, and one in the laundry, with an extra half-lot on the linen room shelves for emergency needs.

Storage of Soiled Linen.—Left-over soiled linen can be reduced to a small amount if there is good organization of the week's work for the laundry. If the equipment is adequate for the total amount of work to be done, then the system used should operate so that one lot of linen is finished each day, and the way cleared for the next day's lot.

However, if it is not possible to do this, then there must be some means of caring for the left-over linen. Nothing is more discouraging to the workers than to see in the corner a heap of soiled linen that never seems to diminish. The linen is usually collected in muslin bags or laundry nets, and taken to the laundry in canvas trucks. The careless bundling of soiled linen by tying it in soiled sheets or tablecloths causes great chance for waste; the dirt is ground into the covering piece of linen, and the weight of the bundle is likely to tear the corners of the sheet.

If the collection trucks are not to be used again that day, the left-over bundles may remain in the trucks. Otherwise the bags or nets of linen must be stored in a dry, well-aired place, and in a container that will keep them off the floor. One hospital superintendent solved the problem by providing a deep bin, one side of which was hinged in the middle so that it would be easy to reach the bottom of the bin. Wire netting in the door will provide ventilation, and will also facilitate checking up on the amount of soiled linen in the bin. Stored soiled linen must not become forgotten linen.

Life of Linen.—Every institution superintendent realizes the value and the need of knowing how long linen might be expected to last. Such knowledge would to a certain extent regulate the budget allowance for the year, and would act as a check-up on the wearing quality of one set of linen as compared with another. One might keep a card catalogue recording names and addresses of merchants, names of brands, cost, and the date of purchase. Then the linen should be dated with a record of the month and year it went into service. If the plan of equipping is on the two-lot system, one set in service and one set in the laundry, it is comparatively easy to trace the number of washings per piece.

Such records will not only act as a check on the wearing power of the linen, which might be due to quality, but will quite plainly prove the superiority of one kind of supplies over another as well as ill effects of careless handling. The cost of linen cannot always be depended upon to act as a guide for the next purchase, but the wearing quality should be fairly measured by this study. The study of supplies, such as soaps and bleaches, will help to save the linen, as well as result in savings in laundry operation. In the linen study one must also take into consideration the wear from use and from machinery, and the loss resulting from poor laundry counting.

The following outline of the life of linen, while it is compiled from different sources and represents only a tentative study not carried to its final proof, is offered as a suggestive study, which may serve as a guide to supervisors in their own investigations.

Club Use

Table linen washed twice a day	25 washings
Table linen washed once a day	49 washings
Table linen washed alternate days	80 washings
Table linen washed twice a week	150 washings

Club—Residence type:

Bath towels, washed when soiled	3 yrs.

Dormitory A:

Sheets, washed once a week	4 yrs. 4 mos.
Pillow slips, washed once a week	4 yrs. 4 mos.
Towels, face, washed twice a week	2 yrs. 2 mos.
Towels, bath, washed twice a week	2 yrs. 2 mos.
Napkins, washed three times a week	4 yrs. ½ mo.

Dormitory B:

Bath towels (gym), washed	4 yrs.
Towels, washed three times a week (9 mos. use)	41 wks.
Tablecloths, washed once a week (9 mos. use)	45 wks.
Napkins, washed twice a week	4 yrs. 2 mos.
Sheets, washed once a week	3 yrs.

Waste in Laundry Management.—As pointed out above, the laundry suffers through untrained labor, lack of organization, or ignorance of the supervisor. The causes for waste should be of interest to every laundry supervisor, and the institution is certainly warranted in changing heads of departments if waste continues.

The material presented in this chapter can serve only as a check-up, for no institution would be lacking in all the points listed, and those with trained leaders may lack in none.

Classification of Waste:

WASTE OF SOAP.—This may be caused by:

1. Running water too high in the washer, the excess water requiring more soap for suds.
2. Filling the machine with suds, then running water down to a lower level after soap is added.
3. Not building soda into soap solution. Soda reduces the cost of soap, because soda cuts grease and costs much less per pound than soap.
4. Using too much soap. An over-amount of soap produces such a frothy suds that the clothes ride on air, washing more slowly and not as well.
5. Using dry soap chips or powder, and not allowing time for it to dissolve and form a suds before adding more soap.
6. For very soiled or greasy clothes, not allowing a soda wash before soap is used.
7. Using poor soap that is weighted with impurities or with excess water.
8. Paying for soda at soap rates in using washing powders.

WASTE OF WATER.—So long as water runs freely from the faucet, it may seem foolish to list it as a chance waste. These points do play only a small part unless one considers water tax or the evil of waste on general principles. Waste of water comes from:

1. Overfilling the washer only to send the water down the drain.
2. Leaving faucets open, so that water goes down the drain.
3. Constant dripping from leaky faucets.

POOR SUPPLIES.—The checking up of the quality of supplies requires knowledge, either practical from extended use, or, better still—because accurate—from analysis. It is poor economy to provide:

1. Poor soap—not well balanced in making (in factory or home). It introduces excess alkali, which is hard on fabrics washed, and is itself needlessly expensive, as it has been bought at good soap cost.

2. Dirty soap and soda from poor storage as well as poor manufacture; not making good suds and perhaps lending color to the water, which affects the goods.
3. Poor bluing—containing considerable iron, which will settle on clothes if they are not well rinsed of soap.
4. Bluing which does not dissolve, forming streaks and spots, or too much bluing, because measure is not standardized. (All bluing does more work than expected. Well-proportioned amounts of clothes and blue leave little blue water to run down the drain).
5. Starch that is dirty and not well measured. The modified starch has the greatest economy because it rarely lumps, and penetrates the fiber so that all can be used.

Expensive Purchasing.—This waste may come from:

1. Buying in too small quantities.
2. Buying in packages when a quantity can be stored without loss by deterioration.
3. Buying in quantity, with poor storage facilities.
4. Getting poor quality for price.
5. Buying without bids and contract, and without standardized requirements from analysis.

Machine Waste.—This is an important item, worth careful consideration.

1. Dirty machines cannot produce clean clothes. In time they will not run smoothly, as they block themselves. They carry dirt over to clean clothes, necessitating a second wash—which means more soap, more soda and more water—not counting wear on clothing, cost of time and power.
2. Over-use of oil and grease, besides being a direct waste, creates dirt on the floor, gathers dirt about the machines, and in time clogs the machine.
3. Lack of oil and grease permits friction with consequent wear of machinery.
4. Loose belts will waste power, and waste power is being paid for on the electric meter or by coal and fireman's time used to produce the electricity.
5. A loose belt becomes a menace, because likely to slip from the pulley and entangle itself in the gearing.

6. Machines standing idle are a waste as they occupy space and represent investment that should be of service.
7. An ironer left under pressure when not in use deteriorates. Pressure flattens the felt padding and scorches the muslins.
8. Lack of steam reduces the ironing power of machines, and, in turn reduces the output and increases the productive cost.
9. Lack of individual motors—that is, a separate motor on each machine—increases the cost of operation of machines.

Careless Methods.—Poor organization is a waste most often due to ignorance, because the laundry is in the hands of untrained labor. It reaches over all the plant, and many times is not discovered early. Its sources may be found in:

1. Lack of time schedules. The use of a washer without a time schedule opens one avenue of waste, which repeats itself in ratio as the machines are multiplied. Lack of time schedules brings about losses in labor, supplies, machinery, power, and production.
2. Poor arrangement of machinery, so that workers are constantly in each other's way, thereby being hindered as well as irritated. The work does not travel in direct sequence of processes, and therefore retards itself.
3. Lack of rules for employees, allowing them to scatter their forces and become generally disorganized as to hours of work and rules of behavior. Time study and piece work and definite duties are the cures for this.
4. The incompetent and careless worker. If rules and instructions do not produce standards, and if the type of worker is careless and without ideas of system and cleanliness, it may be necessary to discharge him. The age of worker controls to a degree the kind of work, the amount accomplished, and if a new employee, the way in which he becomes a part of the organization.

Elimination of Waste in House Supplies:

A. Worn towels to be used for:
    1. Pathological laboratory, pharmacy, etc., in hospitals
    2. Sanitary pads
    3. Bath towels for wash cloths
        floor mops
        floor cloths

B. Worn sheets to be used for:
    1. Ironing covers
    2. Poultice cloths
    3. Baby cribs
    4. Out-door cots
    5. Handkerchiefs
    6. Cleaning cloths—windows
    7. Dust covers

C. Worn pillow-slips to be used for:
    1. Poultice cloths
    2. Cleaning cloths

D. Worn tablecloths to be used for:
    1. Napkins
    2. Tray cloths
    3. Infant towels
    4. Wash cloths (infants)
    5. Linen squares to be used and burned

E. Worn spreads to be used for:
    1. Pads
    2. Babies' cribs
    3. Cleaning cloths
    4. Floor cloths

F. Worn blankets to be used for:
    1. Crib blankets
    2. Bath blankets
    3. Hot-water bag covers
    4. Bed-pan covers
    5. Bandages—baking machines (local)
    6. Cloths for hot applications
    7. Babies' sleeping bags
    8. Woven rag rugs
    9. Polishing cloths
    10. Scrubbing cloths
    11. Mops

Questions

1. Chart your organization showing the relationship of every employee to the one who represents the highest authority.
2. By a score card which best fits your institution, make an attempt to rate your workers and yourself.
3. In what ways could your laundry produce a greater output by rearranging either methods or force?
4. To how great a degree is it practical to have an organized welfare department?
5. What are the arguments pro and con concerning a State License for a supervisor of a laundry?

CHAPTER XXIV

SUGGESTIONS FOR TEACHERS

Any suggestions offered here must necessarily be of a varied nature, and must be adapted to suit the needs of each class, because no fixed rule can be followed either in equipping laboratories or in conducting class work. The first task of the teacher is to present facts that link the subject of laundry work with other phases of Home Economics work. Too often the teacher does not give consideration to what is the motive of such a text as this—that is, conservation of textiles through careful and effective renewal—because she has been trained primarily to produce clothing from new material and not to renew clothing by good methods of renovation.

Fig. 168.—Class of beginners. A kindergarten class lesson at Teachers College, Columbia University.

Part of the teacher's work, too, will be to arouse interest in a subject which for centuries has been considered drudgery (Fig. 168). Every student has to be introduced to the interesting and far-reaching relations of laundry work, because she has always considered it merely as an everyday necessity, or as one of the pronounced drudgeries of life. She should be made to realize at the very beginning of her course that laundry work is a science, that it has untold possibilities in its relationships to textiles and chemistry, and that it also has a definite and important linking with physics, which is too often considered too mathematical to be interesting to the non-mechanical mind. If the teacher is careful to show how closely these subjects are correlated, it will not be difficult to create a live interest.

Correlations.—Many college students have been keenly interested in working out the suggestion of listing all subjects presented in the school curriculum, and, through the classroom experience, illustrating points of definite correlation between these other subjects and laundry work. The following study, presented by a student, may illustrate this suggestion:

1. History, Geography, and Laundry:
    - Foreign methods and customs
2. Economics and Laundry:
    - Labor-saving devices
    - Valuation of time
    - Home work *vs.* sending work out of home
    - Cost of fabrics
    - Care and renewal cost of fabrics
3. Chemistry and Laundry:
    - Hard and soft water; various softening agents
    - Cleansing agents; soaps, blues
    - Comparative value of cleansers
    - Solubility of stains
    - Effect of chemicals on fibers
    - Neutralization of chemicals
    - Chemistry of supplies
4. Physics and Laundry:
    - Water systems
    - Electricity
    - Power
    - Heat
    - Ventilation
    - Comparative value of machines; type, mechanism
    - Home-made labor-savers
5. Mathematics and Laundry:
    - Purchasing of supplies
    - Buying of ironing-machine pads and covers
    - Weights and percentages

    Making of solutions
    Keeping of laundry lists
    Correct height of working surfaces
    Floor plans and placement of machines

6. Hygiene and Laundry:
    - Necessity of cleanliness
    - Public wash-house as well as public bath facilities
    - Sterilization, disinfection
    - First aid

THE HISTORY of laundry work may lead the class to a study of development in supplies, and the great advance in equipment, including the present-day much-talked-of power washing machines and other mechanical equipment. The study of foreign women and their methods of washing introduces geography, costumes and customs, as well as methods. Lantern slides are both entertaining and instructive for this special phase of the work, and they always present the subject matter in a fascinating manner. Motion pictures will teach the efficiency of the up-to-date processes used in the commercial laundry and will introduce a new idea of the work and the worker in the large power laundries. The manufacturers furnish valuable educational material through motion pictures, which illustrate processes followed in the production of certain products. At present the teacher may obtain reels from the starch manufacturer and the soap industries, the latter one presenting very excellent detail on cotton as prepared for fabrics and on fats as prepared for soap.

ECONOMIC CONSIDERATIONS will lead the students to present facts as obtained from a cost study, first of the new garment, and second of the price asked for renewal by the laundress, by the commercial laundry, and by the dry cleaner or dyer. With this cost study, one must present for consideration the value of new supplies, the saving by the use of up-to-date equipment, the cost of having the work done at home and by the laundry, either as "wet wash," "bundle work," family work, or flat work. With all this cost study, where can be most profitably introduced the study of the comparison of the electric washer and the new methods with that of the less progressive ideas? Is it true that machines mean more expense? Have we ever studied and established the capacity of a machine and a worker by the modern methods?

Can we iron by machine without drying and dampening, and so save the time used for sprinkling?

CHEMISTRY and laundering of clothes have had a very close relationship, because laundry work depends upon the understanding of the special tendencies of the fibers, of the effect of cleansing agents on textiles, and of the extent to which various supplies may be of service or of harm.

SEWING, economics, and chemistry form an interesting triangle. It is not the part of this book to present patterns and the special art of construction of a garment bearing on the resultant ease in cleansing, but after years of experimentation it does seem necessary to promote thoughtful discussions along the following lines:

> *Fabrics:* Their combination may be artistic, but all combining of fabrics should also be studied from the practical viewpoint of women who must consider the cost of upkeep.
>
> - Comparative cost, wear; cost by yard, width for economical cutting, cutting of material for wear, creasing and pressing, fraying
> - Percentage of shrinkage
> - Possibility of equal returns on cleansing
> - Fastness of color
> - Poor economy in trimming a washable material with a non-washable one
> - Trimming needing redressing, but of itself so designed as to prohibit a proper renewal
> - Damage from rusty hooks and eyes
>
> *Patterns:* The domination of style *vs.* economy. The trouble involved in—
>
> - Making a dress of washable material by a pattern which makes ironing impossible
> - Knife plaitings—involving the cost of a special machine, the cost of sending to the professional, or the annoyance of having the plaiting so out of order that it is never pretty or stylish
> - Bias folds which are wide—making the ironing a time problem, with unsatisfactory results
> - Bias and straight material combined in such a way as to make the ironing of one spoil the finish of the other

Closed-in sleeves with stiff cuffs, making it impossible to iron except by the special machine in the commercial laundry
Various linings stretched in stitching

Trimmings: The domination of style or ignorance of material *vs.* economy. The use of

Braids that shrink
Non-washable material
Expensive tulle
Buttons on metal shanks, which must be ripped off and sewed on each time of laundering, or be allowed to rust, necessitating the purchase of new buttons
Button ornamentation or beads that are molded composition and so soluble in water, or dyed beads that are not fast color
Embroidery threads that are not fast color
Wool embroidery on cotton dresses that need starching
Cotton thread for stitching silk

For practical illustrations of these points, many having been furnished by students, the following may be taken from one lesson:

> A ready-made white muslin dress cost $10.00. The student reported this history: It had been twice dry-cleaned at $4.00 per cleaning, because it was trimmed with cord-like rolls of cotton batting, banded at equal distances with black floss to represent ermine. The owner, who had never had special training previous to her college work, offered to rip off this non-economical trimming and to wash the dress. It took twenty-five minutes to wash and starch it; on account of her inexperience it required one hour to iron it. Had it not been for the trimming and the work involved in putting on the trimming at first cost and twice in renewal, the purchase price need not have been $10.00 or the renewal $8.00. This proper renewal cost should have been merely that of a little soap, bluing, starch—a few cents—together with the value of the worker's labor. Few students have an earning power of $4.00 per hour and a half.
>
> A second example, which is typical of hundreds, was a white silk waist trimmed with purple glass buttons. Clean water used to remove a wee spot from the washable

white silk started the dye on the buttons to bleed so freely that the waist was ruined. White silk will wash and wash well, and so will good beads.

PHYSICS and economics make another grouping with laundry. The minute a class studies equipment, pressure, weight, number of revolutions, and degrees of heat, then electricity and mechanisms must be interesting points of investigation.

MATHEMATICS in laundry work must be used in the study of economics; *i.e.,* the study of cost of equipment, its operation and upkeep, purchasing of supplies, recipes for solutions, and percentages of strength of solutions. Some of the questions that follow might be used for laboratory investigation. For too long a time this housekeeper represented hundreds of others: "Is it cheaper to buy soap by the cake or by the pound? How much does a cake weigh, or what is the equivalent of a pound of soap chips in terms of a cake of soap? I have a washing machine; does it pay to buy soap in the chip form?" We may answer by other questions: "How long does it take to shave a pound of soap? What is the cost of a pound of chips *vs.* a pound of soap in cake form?" The teacher should encourage her students to use the home laundry as an experimental laboratory, and to work out just such practical questions as these.

HYGIENE has perhaps the closest relation of all with laundry work, since clean clothes help to make clean bodies, and hence well bodies. Laundry work should always be presented through the study of health problems, and through individual and community concern for social betterment. In some classes laundry work may be used as an entering wedge for discussions on body cleanliness, suggested through the consideration of the care, use, and cleanliness of clothing. The health problems may turn the attention of the class to civic or community betterment, as exemplified in a public washhouse or a community laundry. In every group—a home, a school, a camp, an army, a club, a battleship, a hospital, or a hotel—laundry work presents itself as a sanitary and economic necessity. The organizations of Girl Scouts require a course of laundry with an examination, and as a reward of high rank the Scout wears with pride the insignia of a flat iron. She is proud to have washed and ironed well!

Let no teacher of Home Economics work ever say or think that she cannot teach laundry work because, as one young teacher once said, "It is so hard to get the soiled clothes." Keep in mind that the clothing presents its own economic triangle—cost, care, cleansing. Let not the mistake be made of stressing the value of clean food only and forgetting clean clothing, for the consideration of clean clothes is as vital as clean food both to the individual and to the community. There never has been a time when the author has not been able to secure plenty of soiled clothes from students, teachers, principals, or even from the neighborhood. Often they beg for the chance of contributing garments, and are willing to wait.

It might be suggested here that the last or review lesson, where students may present special problems, furnishes a test of decision as to methods used—a test as to the time, cost and value of renewal, a test of technic, and a test which is of greatest value and which everyone must credit to education, *i.e.,* a test of appreciation of the worker who can do efficient work. This review lesson flashes upon the untrained mind a realization of value that will materially aid in future decisions.

Choice of Teacher.—If laundry work is accepted as an economic, social and sanitary study worthy of the consideration due any school subject, then the next question is, Which teacher should teach it? At the present time the teacher of cooking usually has charge of the course. This is probably due to the fact that the kitchen and the laundry have long been considered as one unit of the home. From this viewpoint, there is an economy of equipment—the water, sinks, stoves and small equipment like saucepans, cups, spoons, and strainers are already a part of kitchen equipment and can easily be utilized in a more extended way.

The science connection between laundry work and cookery is most pertinent because the teacher has so many opportunities to present and to review. For example, there is the composition and solubility of starch, the composition of fats, the making and use of soaps, the cleansing and solvent power of water, and the solvent power of chemicals. The removal of stains alone, if no other lesson in laundry is taught, forms an excellent review of food principles, changes produced by heat, food dyes and their solubility, and the problems that various compositions of foods present in stain removal.

The teacher of cookery usually teaches serving, which includes the care and cleaning of the table linen after the meals served by the class. The aprons and caps used in class are kept clean in response to the social idea of nicety and the teaching of personal standards. The dish towels always introduce a big item of cleanliness in the kitchen laboratory. But is it good psychology to make dish towels the general work for laundry classes? Are the dish towels used in the laundry class for the purpose of getting them ready for the next day, or are they used for the purpose of presenting interesting problems of chemistry as applied to textiles or to the cleansing of fabrics?

Do dish towels, doilies, caps, and aprons represent all the different fabrics that would be included in the household laundry basket? Is it as interesting a cost problem to establish the cost of washing a yard of dish toweling, as it is of a pretty wool sweater, a silk scarf, or an embroidered piece of clothing? Perhaps it may be that the laundering of such uninteresting things as dish towels, and hence the corresponding lack of interest in other materials, is what makes dry cleaning such a profitable business and one so much patronized by housewives.

From the sewing teacher's standpoint, the technical relationship is much closer between laundry work and sewing. The two subjects present the most fascinating correlation, but not a complete one if the teacher presents only the textile version. The actual materials handled—textiles, dyes, and trimmings of various compositions—are, of course, not kitchen subjects any more than soaps and blues as chemicals are sewing-room subjects. All must be discussed and the correlation shown.

The Cooking Laboratory as Laundry Laboratory.—The choice of location for the classroom laundry will go far toward determining the nature and scope of the work to be done. Insofar as is possible the considerations for a home laundry—discussed on p. 204—should be borne in mind in locating the laundry laboratory.

In considering the cost of introducing laundry work as a laboratory subject, the first means of reducing expense is through using the kitchen laboratory. Here the large stationary pieces of equipment are set up, and if the room is not too small, the combination is very practical—provided the teacher is not asked to teach the two subjects at the same time.

Equipment.—Small agate pans of distinct pattern to mark them from dishpans may be used for wash tubs. Wooden or papier-maché tubs are more like real wash tubs, but could not be used for boiling the clothes and are not so practical for stain work or for dye. The individual table and cook-stove equipment will offer opportunity for each student to do her own individual work. One boiler may be put on the large cookstove of the laboratory to take care of the garments of the whole class after each girl has prepared her own individual garment. Some group work is good, but there should always be a certain amount of individual work, for which each student is held responsible. Where one suggests individual work it should not mean, necessarily, all students doing like problems, but it ought to mean individual problems and responsibility.

Driers.—Many teachers will have to plan to leave the clothes hanging in the laboratory after the class has gone, appointing one student to return and take down all the clothing for this section. If the shortness of the laboratory period necessitates such an arrangement, some easy ways of caring for the wet clothes will have to be established. A classroom laundry will always need some sort of a drier to hasten the work which must be done within short class periods. This can be done through the use of a drier of the room type, or a small adjoining room with ample hanging space. If a drier is installed, it should not occupy the center of the classroom, but should be in a corner out of the way, for the instructor should be able to direct many students at varied tasks. (See Driers, p. 238.)

The sprinkling should be individual work, and may be done at the individual cooking table. The dining table, which is used for serving, may also be used for this work, if it is covered with white oilcloth.

Ironing Equipment.—The individual cooking table will afford space for the ironing of small pieces. Small boards, the size of dough boards, may be covered to illustrate an ironing board, which it may not be practical to use on account of its size. This, besides giving an individual ironing space for each student, has the added advantage that she may be held responsible for the care and cleanliness of her board. She is given a square of padding and a square of muslin, with thumb tacks as fasteners, and is required to see that her board is kept in good condition.

If there is room to set up a skirt board, larger garments can be used for class work. The cooking table will also be freed, and available for other work. Such a board may have a wooden leg attached to one end with a hinge; when in use, one end of the board rests on the table and the other on the wooden leg. Such a board needs to have an extra cross-piece attached to the leg in order to make the board steady. The suggestion of having ironing boards fold up into the wall is good if space only is considered. Such a board, of course, must be set up against a wall space, usually away from good light. This light is much more necessary for the ironing boards than for the wash tubs. (See pp. 204, 211.)

PLANNING FOR GROUP WORK.—A teacher may have older students, who will be more interested if larger articles of clothing are used, just as would be found in the family wash. This necessitates larger utensils. If space is still a problem, the only alternative seems to be group work with three or four students washing at one tub, and with one wringer and one boiler for the entire group. This group work requires much thought on the part of the teacher, in order that each member of the group may have a certain part of the process for which she is responsible. A plan can be worked out, but it is not very satisfactory, because no one is responsible for the whole garment, and, naturally, no one is likely to acknowledge careless washing or ironing. If the washing of one lesson waits over to be the ironing of the next lesson, as is usually found necessary, perhaps good utilization of the room space and the time of the lesson, and the thought of keeping the students busy, can be best brought about by having half of the group iron and half wash during the first part of the lesson. As each group finishes the process it was doing first, it may go directly to the second.

A Separate Laboratory.—It will be easily recognized that, while this scheme of using the kitchen laboratory as a laundry laboratory may serve if necessary, it is not very satisfactory. The ideal way is to have a separate laboratory for laundry work, where the equipment may be of the special nature adapted to such work. A separate laboratory will certainly add dignity to the course.

SIZE OF CLASS.—Where a special room for the laundry is planned in the building, the first thought for the teacher to consider is what sized class can be comfortably handled. It will be found impractical to attempt to care for as large a group in laundry as in cookery. Sixteen to twenty is a much better number than twenty-five or thirty. The work, unlike cooking, can rarely be carried on exactly the same time schedule for each student, because the stains of some garments take longer to remove than others, or the ironing of certain garments may be more difficult and hence take longer to do. Moreover, in the laundry class the students usually furnish their own working material, which in many cases is of considerable value, and if scorched cannot easily be replaced. All of these points increase the work of supervision. Two students can do good work at one tub, even though they each have a garment. Often, for the sake of greater variety, the two students may have different garments, but for the sake of the point of the lesson both garments should represent the same principle.

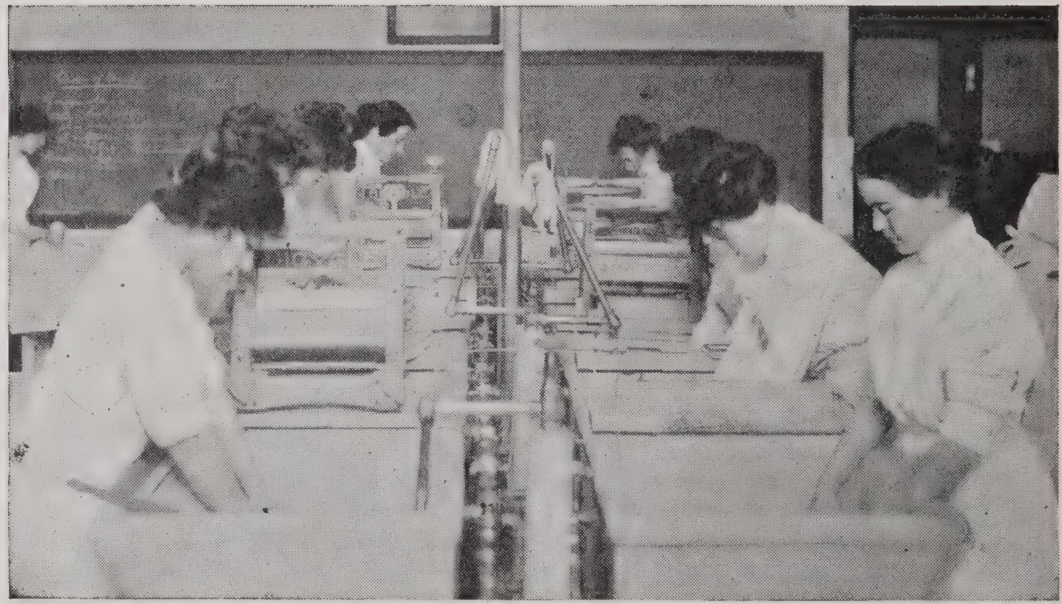


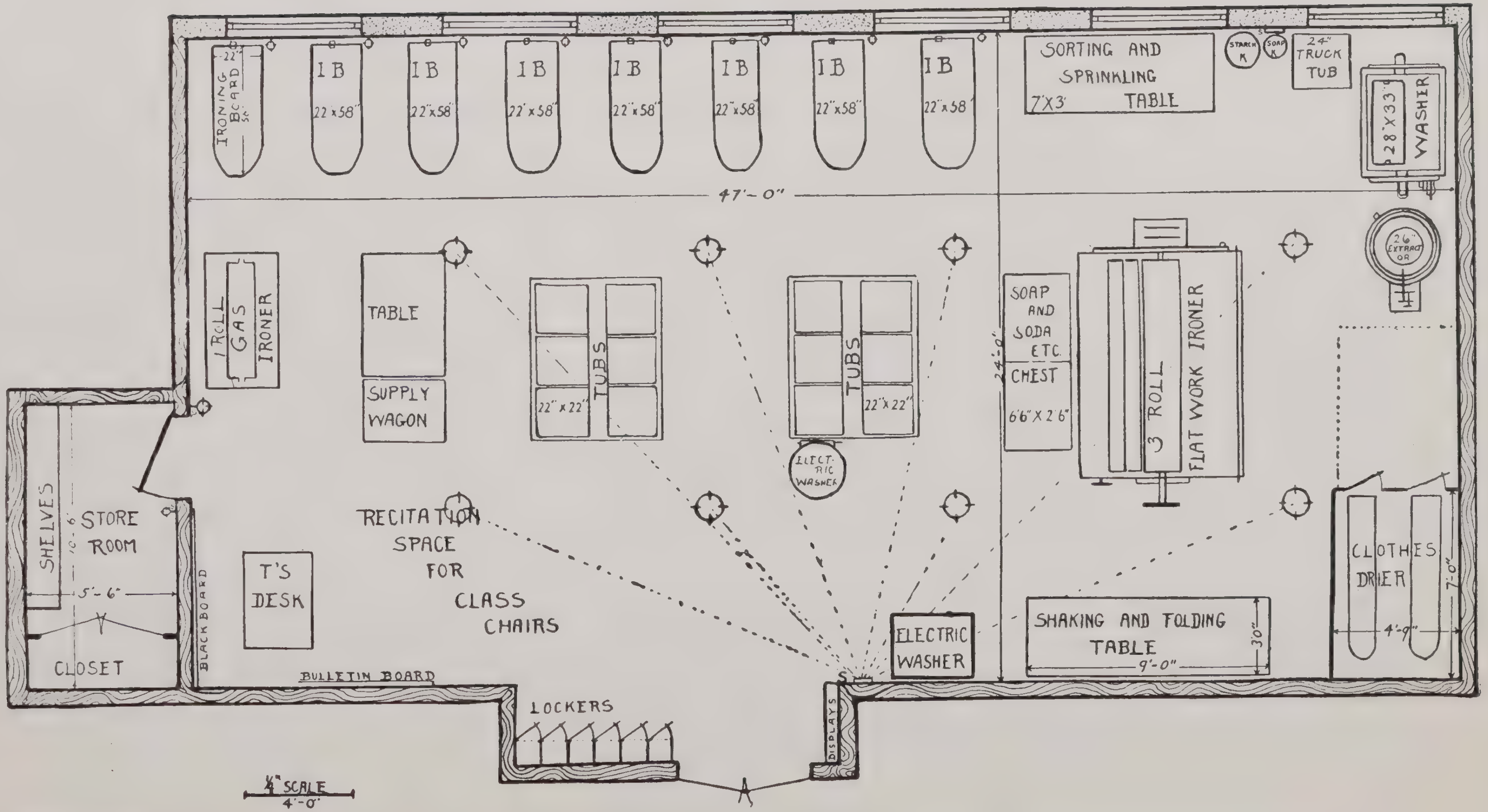
FIG. 169.—Domestic laundry laboratory

CHOICE OF ROOM.—It seems unfair for students to be deprived of the training just because a laundry classroom was not originally planned. Were it not for the extra work on the part of the teacher, a section of the basement of the school makes a good laboratory, for with a lattice-enclosed yard, it is quite possible to establish an efficient drying space (Fig. 169). Finding no other place, the author once utilized the full-story and well-lighted attic of a high school. The clothes line was stretched there, and two students were responsible for hanging the garments of the class. The suggestions on equipment will assist a teacher in setting up such a laboratory. (See pp. 202, 203, 213-252, 338, 344.)

PLANNING FOR INDIVIDUAL WORK.—Individual work requires a much larger expenditure of money, because of the many pieces of equipment needed. It is, however, the best method of work because each student may be held responsible for her own efforts and results. It is a good plan to have pairs of girls at adjoining tubs work in coöperation, both washing in one tub and rinsing in the other. In this way much time is saved. To every other tub may be attached a steam valve, which permits live steam to enter the tub, thus converting it quickly and easily into a boiler with less danger than lifting the clothes boiler from the stove. This steam valve should be like an arm that reaches down into the bottom of the tub, and may be lifted arm-fashion up out of the way when not needed. A fifteen-pound-pressure boiler is all that is necessary to operate this steam valve. It is possible with individual tubs to show variety of equipment, as to cost, shape, and efficiency; the washboards, wringers, clothes sticks and irons may represent different makes. The individual work also makes possible the use of different kinds of starch and blues in the same lesson, students making comparisons as they work side by side.

Arrangement of Laboratory.—Arrangement of Tubs.—The aisle between two double rows will be found very easy to supervise, because by standing at the head of the aisle the teacher may direct two rows, or even four rows of students. For small classes twelve tubs can be well arranged into three blocks or squares, leaving room at the end for the placing of washing machines. (See Fig. 170.) This placing of the tubs is done by standing them back to back. As the classes or the ages of the students, especially in grammar and high school, vary to such an extent, two heights of tubs should be considered, one row of tubs set lower than the other row. This is a great advantage for all students. The general heights for training schools and colleges will naturally as a whole be higher, but even in this classroom one set of tubs can be as high as 38 inches or 40 inches from the floor to the top of the tub, and the lower ones about 36 inches. In the author's experience, out of 1100 students in the laboratory in ten years, only three have had to use a four-inch platform at tubs set 36 inches high. The larger percentage need a higher tub.

The hollow square arrangement is not so satisfactory for the laundry classes as for cookery classes. The teacher may walk on the inside of the hollow square and demonstrate how to stir or to measure, but to show a student how to wash or to wring a



Drawn by Mabel Kersey.

FIG. 170.—Floor plan. Student's problem: to plan a laundry to be used as a class room and as a laundry to do school linen.

garment, the arrangement is not so satisfactory; the plumbing is in the way of the washboards, so the instructor must walk out and around in order to assist the student. The arrangement of tubs around the wall, following an old idea that laundry tubs must be in front of the window, is very poor; it is a hindrance to the teacher, gives badly directed light for the students, and makes cleaning difficult. Hence, the arrangement of tubs in double rows is best.

IRONING BOARDS or tables should be as nearly individual as possible. For students who are training to teach, it would seem advisable to have variety in equipment, as its use will better prepare them for various localities and types of work. For example, choose a plain skirt-board, to rest on two chairs, one with a folding standard, and one with its own heating appliance and sleeve-board. This last type of board is most suitable for the special laboratory, but is too expensive to use with classes representing poorer homes and at the same time requires laboratory space.

WASHING MACHINES.—In this day when so many machines and devices are used, it would be wise to choose washing machines that represent different principles, as well as to have machines that may be of service in rural homes where perhaps electricity is not possible. Oftentimes the manufacturers are glad to loan the machines for the instruction of the class, or they may send demonstrators to show the working of the machine or device. This is a coöperation between manufacturer and teacher which can be of service to both, and under right business arrangements the relationship is good for all. Such an exchange is free from advertising beyond the comparative study of one machine with another, because the teacher is in the work for an educational purpose. She does not write letters that could be used for advertising material. The trade appreciates this coöperation, and with the help manufacturers receive from an honest teacher who may contribute her knowledge of chemistry, fabrics, and methods, the business is of advantage to both parties. From the cost side it seems entirely fair for the manufacturer to bear the expense of shipping to the school, and the school to finance the return. Even at this cost the expense is little, and the machines are of great educational value to the school. The teacher should realize that while the manufacturer reaps some reward in advertising from this use of his machine, he is really conferring a favor in contributing it because many times he cannot dispose of it after it has been used by the school, so must count it as a total loss. Therefore, the school should be fair enough to the manufacturer to meet him half-way. If the school buys one machine, this purchase probably instantly closes the door for a comparative study of machines, both because of expense and because the school has established itself as in favor of a special machine. Moreover, such a purchase necessitates the use of a machine that is soon out of date, because all the washing machines are being constantly altered and improved.

Lockers.—If the plan is to wash the clothes in one lesson and iron them in the next, the rough-dry clothes will have to be stored for over-night or more often for one week. Washable bags, each marked with the student's name, may be used. Individual lockers about a cubic foot in size, each with its own key, will be found the most convenient, as well as the safest way to keep the clothes. The lockers should be ventilated by wire netting in the door. The instructor has a master-key, so that supervision is possible.

Storage of supplies and equipment should be given careful consideration on the part of the teacher. The most satisfactory way will be literally to build the closet around the equipment. Folding skirt-boards may be stored on end in a closet built especially for them. In the same closet above the ironing boards there may be two shelves for sleeve-boards. A closet may be so built that washboards may stand on the shelves book-fashion. The same sized closet that takes the skirt-boards and sleeve-boards will hold three tiers of washboards. It is best that all this equipment be kept in closed closets so that it will be clean and ready for use. In this storage room there may be tiers of drawers; one tier of deep drawers for the storage of new material, and a tier of shallower drawers for the ironing-board covers, ironing pads and iron holders. The supplies may be stored in this same room on shelves.

A two-shelved supply table on a wheeled truck will be found of the greatest value in collecting and replacing supplies and small equipment.

Teaching Aids.—Notebooks.—With a textbook for class study, a notebook should be used for notes about trips, equipment, or special points noted from class discussions. Card catalogues of equipment, illustrated, should be made by each student.

Scoring Results.—There has been much discussion in favor of the students in sewing work scoring their own products, and some very good work has been done along this line. Such scoring is especially good for laundry work, and has a double value. It is done at the close of the lesson when the student makes her own report of the successes and difficulties she has met, and in this report it is surprising how many have analyzed some of the points brought out at the beginning of this chapter. For instance, one student couldn't iron a collar well, because it was so poorly cut and because it had a collar cut straight with a bias lining. In the actual ironing of her garment, she would report whether the iron was hot, whether the garment was well sprinkled, whether there was pressure enough in ironing, whether the iron was clean—all of which shows to the student ways of improving.

The sewing teacher who has done scoring in her own classes should be well fitted to score the work of laundry classes.

SUGGESTIVE SCORE CARD—HOME LAUNDRY

Work Room		50
Construction	10	
Floor		
Walls		
Size		
Relation to building		
Ventilation	10	
Plumbing		
Air		
Heat		
Light	10	
Natural—		
Relation to work		
Size of windows		
Artificial—		
Wiring		
Hoods		
Fire protection		
Equipment	20	
Tubs—washing		
Kinds		
Number		
Height		
Ironing boards		
Height		
Relation to light		
Small equipment		
Storage		
Cleanliness		
Safety protection		

Process		50
Furnishing	10	
Effect on worker		
Ease of cleanliness		
Equipment	15	
Safety		
Noise		
Cleanliness		
Amount of production		
Ease of manipulation		
Supplies	10	
Color		
Odor		
Effect on fabric		
Finished product	15	
Color		
Odor		
Smoothness		
Glaze		
Shape		

Reference Reading.—Outside reading, with reports, should be a definite part of the course, and ought to bring an interesting return to each member of the class. Different subjects can be assigned and each student urged to present illustrations of machines, notes on supplies, or special articles that would be of interest to the class as a whole. The bulletin board for ready reference is a helpful source of information for students. It should be changed frequently, to supplement each day's lesson.

EXCURSIONS.—Often the students have had enough work in the classroom to make them understand the various stages and processes of laundry work and the comparative value of pieces of equipment. Visits to representative laundries will greatly broaden their knowledge and increase their respect for laundry work.

Institution Laundry as a Classroom Study.—The study of Institution Laundry as a course in schools is still unusual, because the institution worker has formerly been trained under the apprentice system—a worker of longer experience guiding the new and untrained one—and there are very few trained teachers. The laboratory may be definitely planned in a normal school or a college.

The agricultural colleges which train state leaders and home demonstrators would meet a most urgent need if a laundry were established to give special instruction to the many and vital demands of the rural woman. Methods and general suggestions, as found in the previous chapters, would apply alike to rural and city workers. The equipment facilities are the only differences between the rural and city problems. With the possibilities of purchasing by mail, even the remote rural housekeeper can increase her working facilities. The gasoline engine should give much service to the woman in her laundry, but it never will until the women are taught how to use it. A combination course, in which institutional and home laundry finally lead to coöperative farm laundry work, would be most practical. The hospitals have asked time and time again for a trained woman; colleges and resident schools must have their residents cared for; orphanages and reform schools can make the work educational as well as a saving to the institution, and the resident goes out at the end of his training with a trade of worth. Laundries, of good standing, have established commercial trade courses, some in close conjunction with universities like Ohio Mechanics Institute and Antioch College in Dayton. Now comes the plea for night schools to establish not only textile courses, but courses in laundry organization and in laundry chemistry as it relates to fabrics and the supplies for cleaning these fabrics. The laundries are doing all in their power and have done much already to establish research institutes; they have good publications through which the workers may get the last word that will help them, and machine manufacturers have offered an up-to-date equipment to make education in the vocation possible. So it is very evident that such courses would meet a great need.

Working Materials.—In a college or training school with a laboratory, there is a greater possibility of working out a planned course, each lesson gradually advancing in logical arrangement. The course is not dependent upon the supply of material furnished by the institution. There is no dearth of material. On the other hand, a surplus of material need not upset the course entirely, just for the sake of the forced production. No classroom work is set aside because the rush caused by the demands of the institution has forced the completion of a finished product rather than the creation of studies towards reduction of cost and fatigue, towards study and analysis of better supplies, and towards the establishment of better work formulas. The most ideal plan is through an arrangement with the college dormitory, or through the school, for the class in institutional laundry to make use of whatever material may illustrate the lesson. The work would not be narrowed in this scheme, as was suggested by the grade classes always doing kitchen towels.

When the students have been able to conquer the heavy machines and understand fully all formulas, then the institution becomes a suitable and most profitable laboratory for the students.

Planning for the Course.—There are two ways of arranging such class work. In the regular laundry laboratory as built for the teaching of domestic laundry—it could not be combined with the cooking laboratory—have an end or side of the room equipped with large power machines. The picture shown is of a laboratory used in this way (Fig. 171). It is equipped with twenty-four tubs, together with other regular laundry equipment. At one end are the essential power machines necessary to teach the principles of washing, extracting, and ironing by machinery. A steam starch kettle and a soap cooker, with a steam drier, complete the equipment. In a three-hour lesson, with ten to twelve students, from three hundred and fifty to five hundred and fifty pieces can be done as training is established. To make the lesson savor of the institution and its abundant work, a washer load of clothes could be washed the day before as practice for a special worker, or to get ahead for the next day. Planning this way allows every one in a small class to be given a responsible piece of work on arrival.

A second method is to use the laundry of the institution, with such machines and such types of clothing as illustrate both equipment and use of supplies. Any work unfinished at the end of the lesson is cared for in the regular institution laundry routine, with regular employees. With this kind of teaching the laboratory should have a small room adjoining to be used as lecture or classroom. The practice work, towards the end of the term, after the specific training has been given, could be arranged for each student in her free time. The laundry always has work to be done, so the student may work first on a washer until all details have been conquered, and then advance to the next machine. The coöperation between the laundry class and the paid workers in the institution laundry is good for both. The student who goes into the laundry for her laboratory practice becomes for the time being a regular worker, and she cannot fail to gain a better understanding and appreciation of the work and of the workers. On the other hand, the presence of the conscientious, enthusiastic student will raise the standard of the paid worker, who will realize

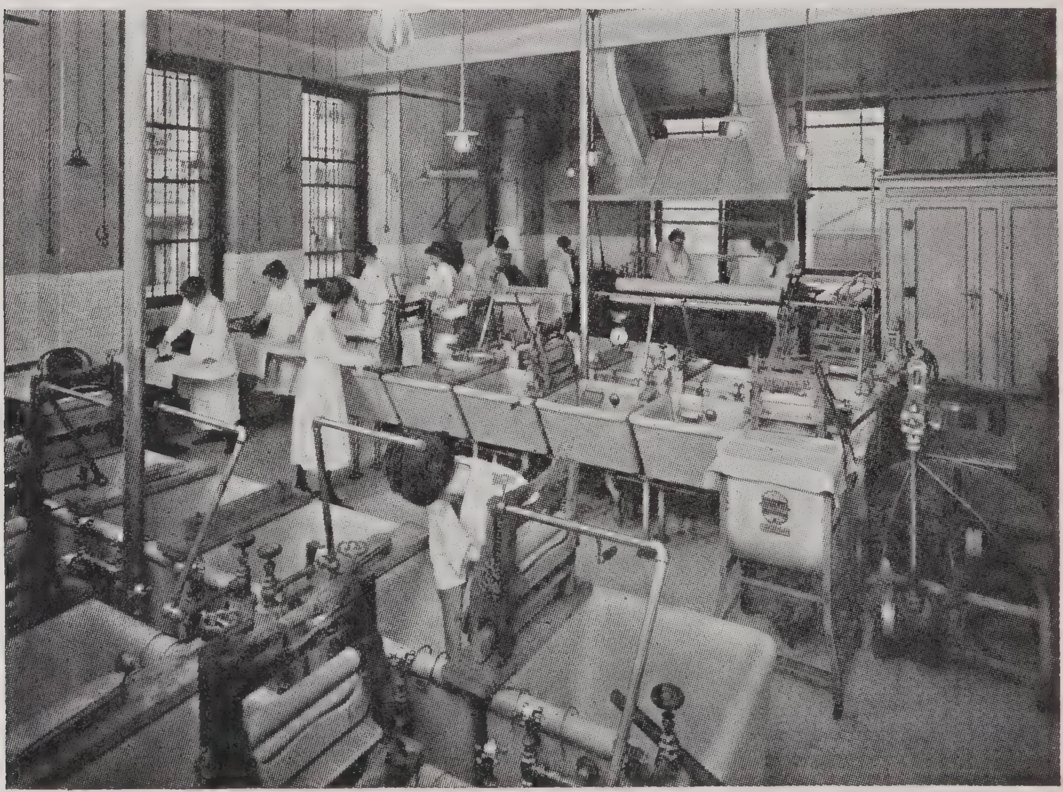


Fig. 171.—Laundry laboratory, Teachers College, Columbia University.

that she is having a part in college practice work; that training must be slow to be accurate and that the good worker does not sacrifice product to speed; and that she herself, through training, may advance to a more responsible position.

Score Cards.—What has been said concerning score cards for domestic laundry work may be applied here as well. The student who is preparing to supervise a laundry will be interested and benefited by working out standards for both plant and laundry work. Two suggestive score cards, which may be of help in such a study, are given below.

LAUNDRY SCORE CARD I

Plant			50
1. Location		5	
Of building			
In building			
2. Construction		15	
Plan	7		
Building material	4		
Safety	4		
Fireproof construction, location and number of exits, etc.			
3. Sanitation		15	
Lighting	3		
Ventilation	3		
Temperature and humidity	3		
Cleanliness	3		
Drainage	3		
4. Equipment		15	
Supplies	6		
Machinery	9		
Adequacy, location and arrangement, noiselessness, fatigue and safety devices, etc.			
Industry			50
1. Work		30	
Routing	4		
Methods	8		
Sorting, marking, washing, etc.			
Finished product	15		
Collecting and delivery	3		
2. Workers		20	
Appearance	2		
Type, clothes, shoes, etc.			
Efficiency	6		
Conditions of labor	7		
Speeding, hours, wages, rest periods, etc.			
Welfare work for employees	5		
Rest and recreation rooms, lunch facilities, care of worker's health, etc.			
			100

LAUNDRY SCORE CARD II

Plant		
Construction		15
Walls and Ceiling	1	
Lighting	2	
Arrangement of rooms	5	
Floors	2	
Size	5	
Ventilation		10
Plumbing		5
Equipment		20
Quality, condition and efficiency		
Washer	5	
Extractor	5	
Flat-work ironer	5	
Body Press—bosom and cuff press	5	

Method		
Building		10
Cleanliness		
Floors	5	
Walls	1	
Ceiling	1	
Windows	1	
Toilet rooms	2	
Equipment		10
Care and cleanliness	5	
Safety devices	5	
Workers		10
Cleanliness and health	5	
Efficiency—No. in proportion to work	5	
Finished product		20
Color	4	
Odor	4	
Smoothness	4	
Fold	4	
Delivery	4	

Testing Laboratories.—Laboratories for testing laundry equipment and supplies should be arranged with fewer duplications of equipment than the regular practice laboratory. They should have, however, a great many electric outlets, because the machines to be tested cannot be permanently established. There must be a floor space equipped as a work space for machines, with steam, electric and water connections, and good drainage facilities. Meters, motors, and measures of all kinds must be ready for service. For laundry work and for dyeing and textile testing the light should be clear and white; for this purpose a few lights may be equipped with "daylight" lamps. Fig. 172 shows an outfit for testing supplies.

SUGGESTIVE STUDIES:

1. Work out the essential points by which a washing machine may be rated. Then test the machines according to working outline, tabulating results. This study should correlate physics and practical laundry tests.
2. By means of the study of chemistry of supplies and chemistry of textiles, establish a working formula and make tests proving the comparative value of:
   A. Soaps
   B. Cleansing powders
   C. Bleaches
   D. Blues
   E. Starches

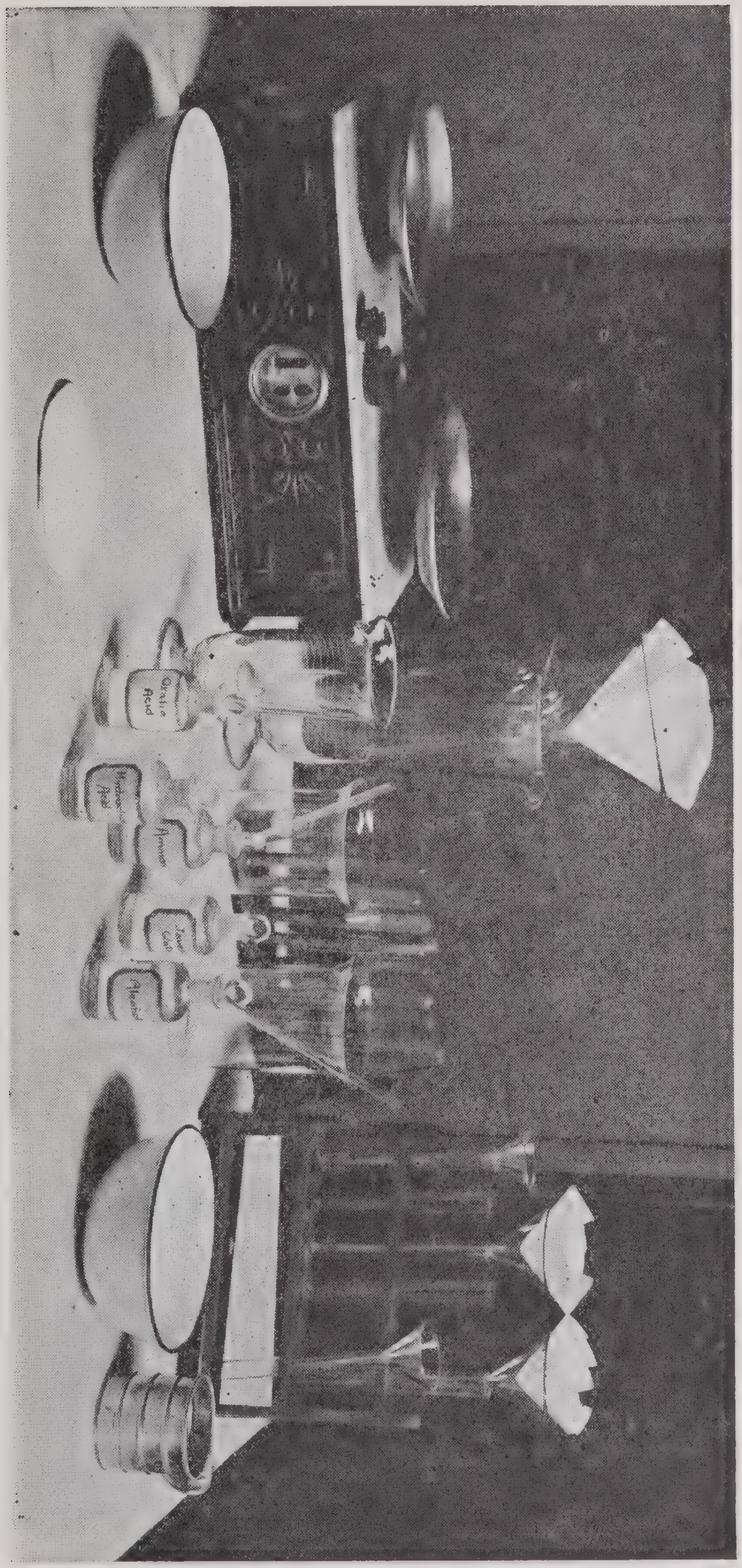


Fig. 172.—Testing outfit for laundry supplies.

3. Through studies, tests, and exhibits, present the comparative economic values of various irons. This study should include purchasing cost, operating cost, renewal cost, and production value.
4. Make a comparative study of cost, effectiveness, and danger of stain removers sold to the housewife.
5. Make a comparative cost study of laundry work, using the following units of comparison:
   A. Laundress and wash tub
   vs.
   Laundress and washing machine
   B. Laundress and wash tub
   vs.
   Commercial rough dry
   C. Washing machine in the home
   vs.
   Commercial laundry methods
6. Make a comparative fabric study from the viewpoints of shrinkage and color.
7. By means of an exhibit well mounted and labeled, demonstrate the cleansing possibilities that might be emphasized in teaching the economics of costume construction.
8. By a correlation of the laws of art and economics with the knowledge of laundering, present studies showing interior decoration that combines effectiveness with economy and time-saving cleansing possibilities.
9. In connection with the Department of Physiological Chemistry, make studies of urine and perspiration stains that will provide data for determining ways and means of removing these stains.
10. In connection with the Department of Physical Education, determine the relation between heights of working surfaces and fatigue. Such a study would involve not only height, but also muscular reactions, poise, endurance. (For advanced students this study could be finally checked by use of a calorimeter.)
11. Determine the viscosity of various starches made under exactly similar conditions; *i.e.,* use in each case the same amount of water by weight and the same amount of starch, and cook the paste in the same size and kind of kettle for the same length of time.

Laundry Outlines.—From the outlines of subjects discussed in this book a teacher will find it very easy to make combinations of lessons, but it should be her thought to combine various articles to be washed in order to illustrate the principle of the lesson. The lesson of woolens may be used as an example. If there must be cutting down of work, because of limited number of lessons or of shortness of period for each lesson, it would seem best to impress thoroughly the fact that alkalies yellow or dissolve wool, that boiling shrinks it, by performing, individually if possible, tests which prove the truth of such statements. Then for the practical work use two articles which represent a woven and a knitted type of garment, such as a shawl or a sweater and a petticoat or shirtwaist. To carry the principle further, one of the garments might be white, and the other colored. In the same way, starching should be taught by laying stress on the various kinds of starch, how to make and use the starch paste, and then choosing two or three garments that need different kinds of starch and different degrees of thickness of paste. One might choose, for example, a man's collar or cuff, an apron, and some garment of sheer material, such as organdy, dimity, or dotted swiss. This lesson would have much greater value if the different degrees of starch paste were made.

Soaps and blues, of various kinds, should be introduced; a different soap and blue could be used for each lesson, having the students make individual observation as to the points which are to be brought out later when soaps and blues are used as the subject of the lesson. In observing the soaps, they should note the variety of color, the odor, and the stickiness; for blues, they should note solubility and color tint. All of these observations make a splendid preparation for the heavier, more chemical work which is to follow. In work of this kind the student who comes to the laundry work equipped with a knowledge of elementary chemistry has a decided advantage over the student who has had no work in chemistry. The latter can work only by rule of thumb, therefore cannot go far on her own responsibility.

Stains and their removal can hardly have too much time. Various stains on various materials should be studied before the lessons on washing, as this will mean that the student may be expected to assume individual responsibility on the days when a stained garment is brought to be washed. Stain work is of untold value, as it brings about the correlation of the chemistry of cleansing agents and fabrics, and it also brings before the student in a practical way the economics of stain and dirt removal. It is this lesson which should be the practical illustration, as well as the individual proving, of the theoretical work which has preceded concerning solvents, absorbents, detergents, and bleaches as soil removers.

Fabrics should be studied thoroughly enough that the student understands the characteristics of the various fibers, their reaction to cleansing agents and to chemicals. Stain work cannot be taught at all unless the student does understand fabrics.

Dry cleaning as a classroom study needs very careful consideration from many points of view. The teacher needs to be able to answer these questions: "What are the fire laws of the community? What are the school facilities for doing this work; must it be done in-doors, or can it be done out-of-doors away from the building? What is the type of student with whom I am dealing? Can they be trusted to use gasoline intelligently; and can they really afford to use it in their own homes, or will they not gain more from a thorough knowledge of washing and ironing?" Any teacher who is contemplating the teaching of this process should read carefully Chapter XVIII.

One of the triumphs the teacher may enjoy at the end of the course is the realization by the students that most, if not all, of the garments they ordinarily send to the dry cleaner can be just as satisfactorily and more cheaply renewed by careful laundering. This is a decidedly worth-while economic study. An exhibit of finished work can be arranged, which will be an education not only to the students themselves, but also to the women of the community.

Equipment may be taught by means of trips to house-furnishing stores, gathering of various advertisements from magazines, or perhaps the securing of printed material, with prices, from manufacturers. In these ways the students will learn much concerning variety of principles, of machines and their general efficiency, as well as comparative costs. In training-school classes the students may work up illustrated card catalogues, including all available information plus addresses and prices. This card catalogue will be of great service to the teacher in her new field of work. It will also help her to make out more accurately her departmental budget.

For young pupils to whom seeing is such an important point in teaching, it is possible to illustrate, demonstrate, and even teach with a child's-size outfit. From the toy department of good stores one can choose such outfits as will be practical and sturdy enough to use in class work. These outfits will care for small articles, some washing machines, for example, averaging in capacity about four handkerchiefs.

SUGGESTIVE OUTLINES:

I

FOR HOUSEKEEPERS

Five lessons—two hours each

- Lesson I. Study of fabrics—characteristics
    - Weave, finish, dye
  - Making cleansing solutions, soap, bleach, spotting solutions
- Lesson II. Equipment—the laundry
    - Choice of—economic purchases
    - Cost of
    - Placement
    - Care of
    - Danger
    - Attachments
        - use of
        - care of
    - Labor savers without power
- Lesson III. Stains
    - To distinguish
    - To remove
  - Cottons and linens—white
    - To wash, boil, bleach, starch
  - Disinfection
- Lesson IV. Ironing
    - Use various ironing equipment
  - Cleanse special fabrics
    - Silks
    - Wools
    - Lace
    - Colored fabrics
  - Machine cleansing of
    - Blankets
    - Curtains
- Lesson V. Special renovation
    - Pillows
    - Cretonnes
    - Carpets
    - Draperies
    - Sponging
    - Pressing
    - Tinting
    - Dyeing

II

FOR TEXTILE CLASSES

Five lessons—demonstration and lecture
Two hours

Lesson I. Study of fabrics
- Weave, finish, dye
- Effect of water, soap
- Effect of grease solvents, absorbents
- Making cleansing solutions, soap, bleaches, wool wash, chemical cleansers

Lesson II. Stains
- To distinguish
- To remove

Methods of washing—cotton, linen
How to iron

Lesson III. Starch
- Kinds
- To make
- To use

Colored cottons, linens
Soap substitutes

Lesson IV. Special fabrics
- Washing silk, wool, lace, gloves, spats
- Tinting and dyeing

Lesson V. Special problems
- Cleansing velvets, ribbons, cretonnes
- Sponging
- Pressing

III

FOR PRACTICAL ARTS STUDENTS

Twelve lessons—three hours each

Laundry work as a regular course in Home Economics departments
Prerequisite: Elementary chemistry
Outside reading required—two hours

Lesson I. General discussion
- Reasons for the work
  - Hygiene
  - Ethics
  - Economics
- Choice of clothing
- Laundry work-room
  - Establishing equipment

Assignment: "Foreign Methods;" History of Industry

Lesson II. Laundering as a business
- Home *vs.* commercial work
  - Woman's part
- Purchasing supplies
- Ways of saving

Discussion of foreign methods

Assignment: Fibers, their structure and their care

Lesson III. Fibers—discussion
- Individual characteristics
- Effects of cleansing
  - Physical
  - Chemical
- Cleansing agents
  - Water, soap, bleaches
  - Heat, acids, alkalies
- Stains and their removal

Assignment: Equipment; mechanical principles

Lesson IV. Equipment—devices *vs.* machines
- Comparison of mechanical principles
- Labor-saving equipment, supplies
- Economy *vs.* production
- Care of equipment

Assignment: Stains—removal of, classification of

Lesson V. Stains—classification of
- Tests
- Equipment
- Principles of removal

Preparation of the work

Washing of table and bed linen

Illustrate processes: mechanical, chemical

Assignment: Starch, methods of starching

Lesson VI. Discussion on starches
- Make various degrees of pastes
- Wash and starch any white garments
  - (Material chosen should represent variety of starch and proportions)

Iron—table and bed linen
- Use all kinds of irons; ironing machines

Assignment: Chemical tests of laundry supplies

Lesson VII. Tests
- Soaps
  - Purity
  - Solutions for economy
  - Make soap
- Blues
  - Solubility
  - Color
  - Tests for iron
- Alkalies
  - Neutralizing
  - Test to prove neutrality

Iron and finish starched clothes
- Use various kinds of equipment

Assignment: Machines; price lists; studies of economics

Lesson VIII. Family wash
- A study of methods, equipment, supplies
- Compare time, cost, results

Assignment: Cleansing delicate fabrics

Lesson IX. Special laundering
- Colored materials, wools, silks, laces

Assignment: Special forms of renovation

Lesson X. Visit to Commercial Laundry (this lesson may be fitted in whenever it seems most helpful)

Lesson XI. Special problems
- Spotting
- Sponging
- Dyeing
- Steaming
- Disinfecting

Lesson XII. Economies: Students present reports of term study
- Discussion of helps for the housewife
- Course of study
- Equipment (this subject depends on the type of class)
  - School
  - Farm
  - Camp
    - Such studies should vary to be applicable to the needs of the community

IV

FOR INSTITUTION LAUNDRY

Eleven lessons—three hours each

Lesson I. General discussion of the value of machine work
  - Economies
  - Sanitation
- Types of laundries
  - Home
  - Community
  - Hotel
  - Institution
  - Orphanages
  - Asylums
  - Commercial
- Advantages and disadvantages
  - Hand *vs.* power

Lesson II. Hand work as illustration to machine
- Illustrate with demonstration
  - 25 pounds dry weight
  - Use all machines

Lesson III. Equipment lecture
- Power washer
  - extractor
  - ironer
  - drier
- Practical work
  - Oil and grease
  - Measure and weigh for machines
  - Control pulleys, belts, and motors

Lessons IV and V. Supplies and substitutes
  - Water
  - Soaps
  - Blues
  - Starches
  - Acids
  - Bleaches

- Practical work
    - Prepare bleach
    - Prepare soda for soap
    - Make soap in steam tank
    - Make starch in steam cooker
    - Starch made in small quantity for comparison
    - Prepare blues
- Lesson VI. Institution wash
    - Demonstrate use of
        - Washer
            - Water content
            - Wash formula
                - (introducing supplies)
                - “ break ”
                - soap
                - bleach
        - Extractor
        - Ironer
- Lesson VII. Institution wash
    - Demonstrate
        - weights—loads
        - checking in
            - marking
            - nets
        - starch
        - use of starch cooker
    - Starching in washing machine
- Lesson VIII. Use of chemicals
    - Prepare chemicals
    - Remove stains
    - Iron rust removing in washer
    - Removing starch by digestion
    - Use of test for checking rinse
- Lesson IX. Renewal and care of equipment
    - Cleaning machinery
    - Repadding ironers and boards
    - Waxing steel roll
    - Cleaning washer
        - Use of acid
    - Washing felts
- Lesson X. Organization
    - Elimination of waste
        - Discussion of various avenues of
    - Economies by organization
    - Marking *vs.* nets
    - Routing of work for efficiency
    - Charting departments and employees
- Lesson XI. Welfare

V

FOR PRACTICE FIELD WORK

First week:

- Make soap and starch according to recipes
- Get accurate count of pieces for week
- Fill and run washer
- Pack and unpack extractor
- Make out order of work (observing each afternoon amount of work done)

Second week:
- Use mangle, body ironer, and hand irons
- Help with sorting of clean clothes
- Work out comparative cost of cleaning washers with oxalic and sulphuric acid, using both

Third week:
- Time flat work—washing and extracting
- Time flat work—mangling and folding
- Compare hand ironing, same number of hours and same number of people

Fourth week:
- Make out monthly requisitions
- Note quantity of felt and canvas for mangle rolls
- Note quantity of muslin for ironing covers
- Note employees and salaries
- Copy rules for laundry

CHAPTER XXV

DEVELOPMENT OF LAUNDERING

The study of the development of laundering processes, and the observation of contemporary methods in many foreign countries today, should be of interest to both housewives and students. Doctor Weeks, in *Education of Tomorrow,* says, " The purpose of education is to substitute learning by understanding for learning by experience." " Learning by understanding " will mean that housewives gain an appreciation of the universality of laundering processes and the part that individuals may play in hastening the progress toward maximum efficiency. For the student, to quote from the same author, " history should be so interpreted and presented that the pupils would not feel the full force of ancient examples; if undesirable, constructive suggestions should be disentangled." Certainly the development of laundering ought to be taught in this way, that students may not be confused by the evident hardships of the primitive methods, but may be led to understand the significance of development, however slow, and to feel the urge to give constructive help for further improvement of the art. It is with these thoughts in mind that we have pre-

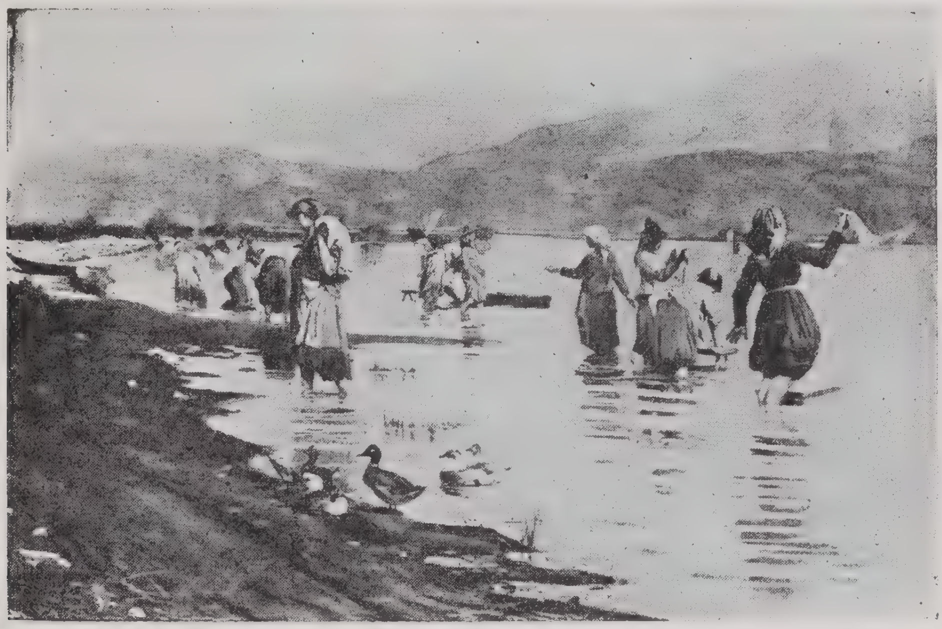


Fig. 173.—Swiss women laundering by flopping their clothes on washing blocks.

sented in this chapter the development of the process whereby clothes are made clean, in the hope that we may prove both how far we have already advanced, and how possible it is to open the mental eyes of those who feel that laundry work must always be drudgery.

Mechanical Development.—The necessity for clean clothes is world-wide, and has persisted in spite of hardship and difficulty in cleansing methods. The early history is, of course, almost entirely of mechanical methods, which depended for their efficacy upon the action of moving water. That history may take us back three thousand years or more; or, the methods used in those days may be taken as typical of the work done in many foreign countries today. It is not time, then, it is education that gives the spark to venture upon new methods which may increase production and reduce labor.

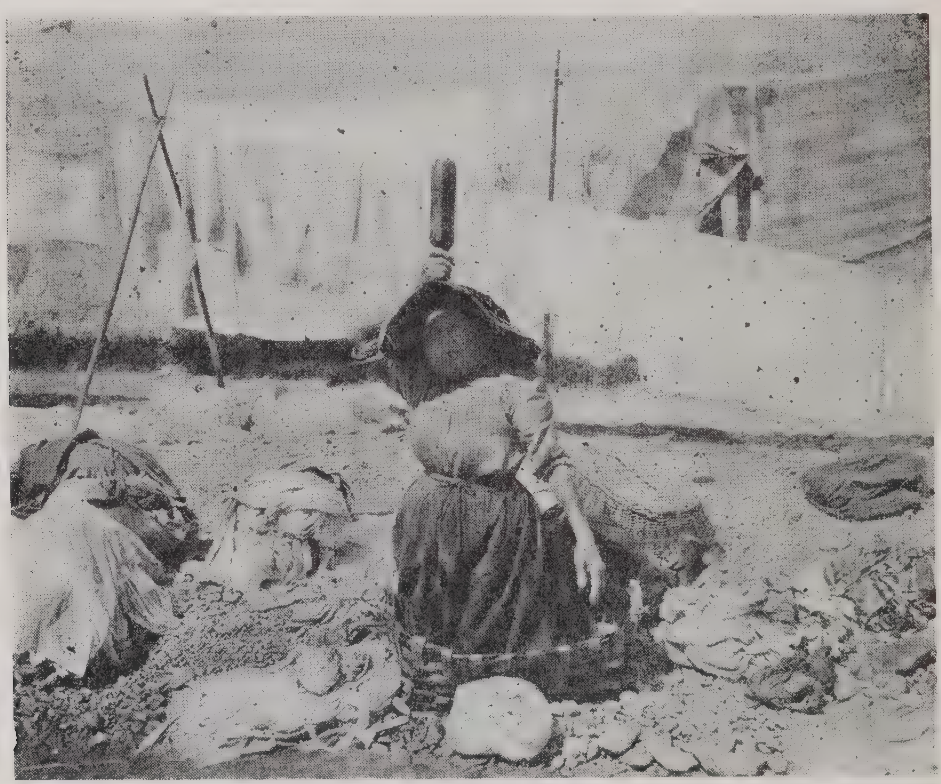


Fig. 174.—French woman using pounding mallet. Note kneeling basket.

Washing.—Since the primitive worker knew nothing of such washing aids as soap and soda, she was for the most part entirely dependent upon the natural resources of her environment. The Chinese woman, it may be mentioned, has always been noted for the use of herbs and barks as cleansers, and her skill in manipulating them makes of them very effective cleansers. Nature supplied the water in the brooks, rivers, and lakes, and the worker used it where she found it. Instead of carrying the water home, she carried her clothes, often long distances, to the bank of the stream, where they were washed and dried. The force of the running water helped to dislodge the dirt from the clothes, which were made clean by the solvent power of the water. If any stain was not soluble in water, there was no way known to take it out. Where the water did not flow with any force, or perhaps was quiet as in a lake or pool, the worker found it necessary to apply force herself, and she resorted to shaking, flopping, treading, pounding. Thus we find that the workers in India, Philippines, Russia, Panama, and Jamaica shook and twisted their clothes in the water or kneaded them on stones or boards (Figs. 175, 176); the Egyptians and Turks trod their clothes in the water; the Swiss either threw them on an inclined board or pounded them with a paddle (Fig. 173). The throwing or slapping method, no matter how adapted, served the same purpose of forcible displacement.

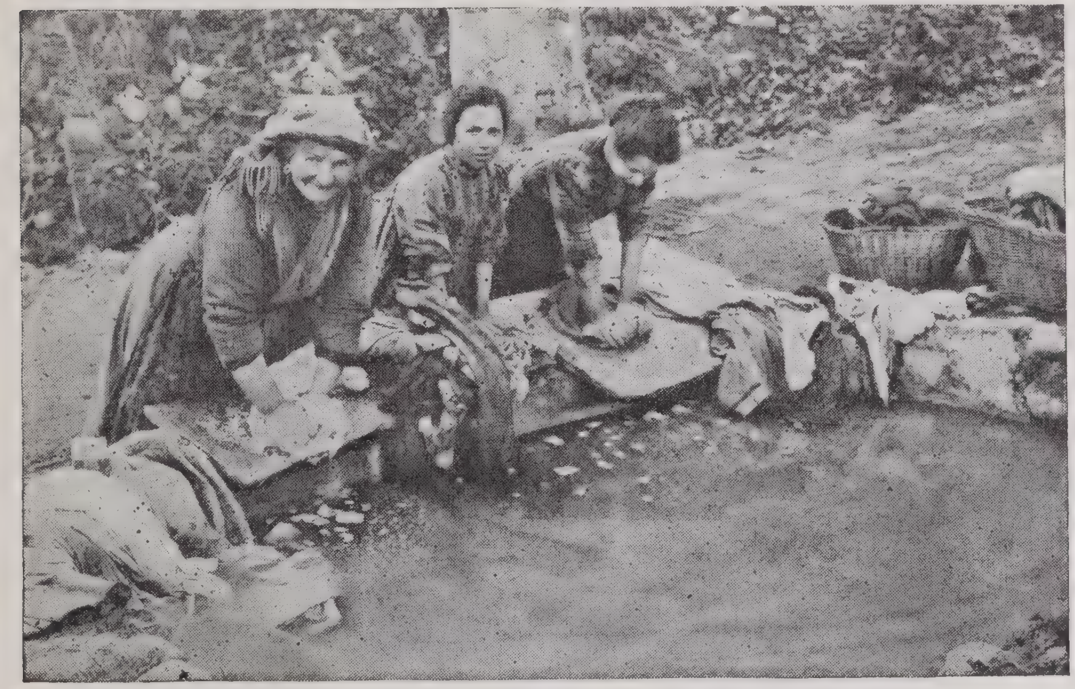


FIG. 175.—Washing on the banks of Lake Como, using the kneading method.

Pounding seems to have been resorted to in a great many countries, different tools being used in different places. These tools were among the first labor-saving devices used in home work (Fig. 174). The Palestine woman used either a club like a wooden potato masher or a paddle like a butter paddle, the French woman a mallet, and others a shovel-like paddle. The wet clothes were laid on a flat rock or board and pounded until the dirt was dislodged. These rough boards and stones were really the first washboards. Sometimes the worker used a scrub brush to clean the clothes as they lay on the washboard. Needless to say, these were not fabric-saving methods. Indeed, in all countries, less thought seems to have been given to saving the fabric than to removing the soil.

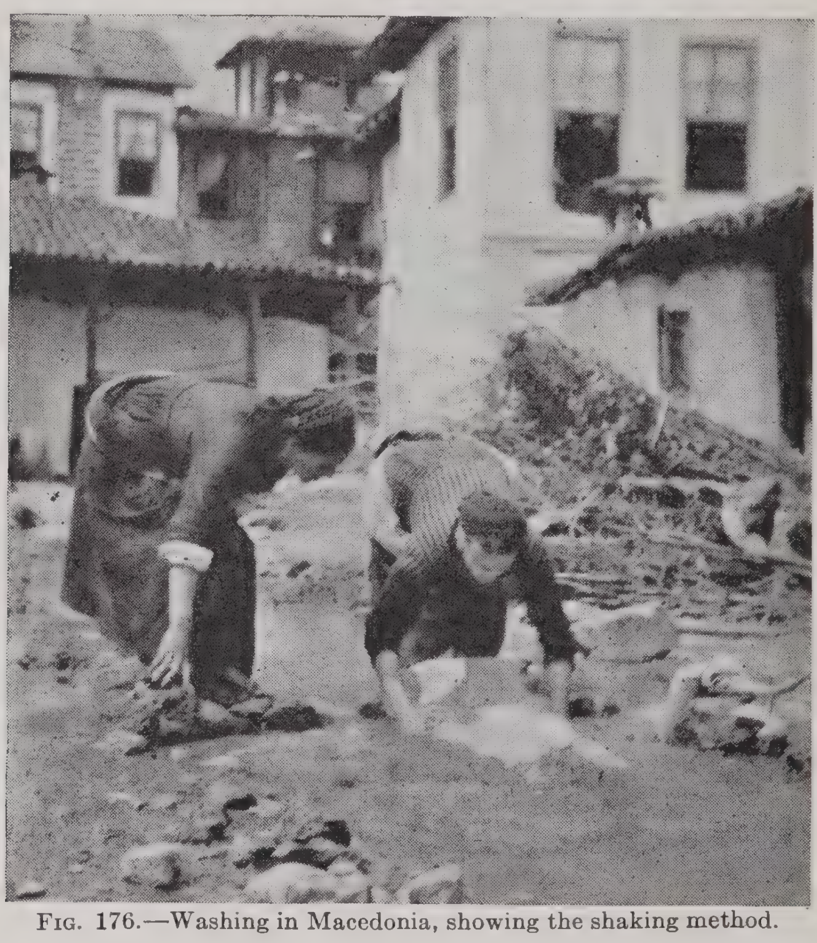


Fig. 176.—Washing in Macedonia, showing the shaking method.

Drying of the clothes was done also along the stream or other washing place. The garments were usually spread on the stones or on bushes. The Chinese run bamboo poles through the legs and sleeves of garments. The careful worker shifts the pole from one leg or sleeve to the other during the drying process by way of shaping the garment, which is not to be ironed.

Pictures of foreign methods give us three very definite impressions. These are the seemingly mountainous piles of clothes, the dependence upon cold water in washing, and the hardships of the work.

The washing of clothes in many countries seems to have been made a festive occasion, occurring only two or three times a year. Special seasons were set apart, when the women were less busy in the fields, or when the weather was favorable. At these times the women of the community gathered at the riverside with their great piles of clothes, and prepared to make the best of a hard job. It was, of course, first come first served, the head of the stream being the coveted place. In a good many countries, India for example, the special day was one not only for the washing of clothes but for the cleansing of bodies as well. Twice a year for washing clothes required large quantities of linen and special facilities for storage of soiled linen, so we find that houses in Norway, Sweden, Germany, and Switzerland are built with large attic lofts. Here the clothes were hung in air instead of being crowded into a clothes basket until the big wash day came.

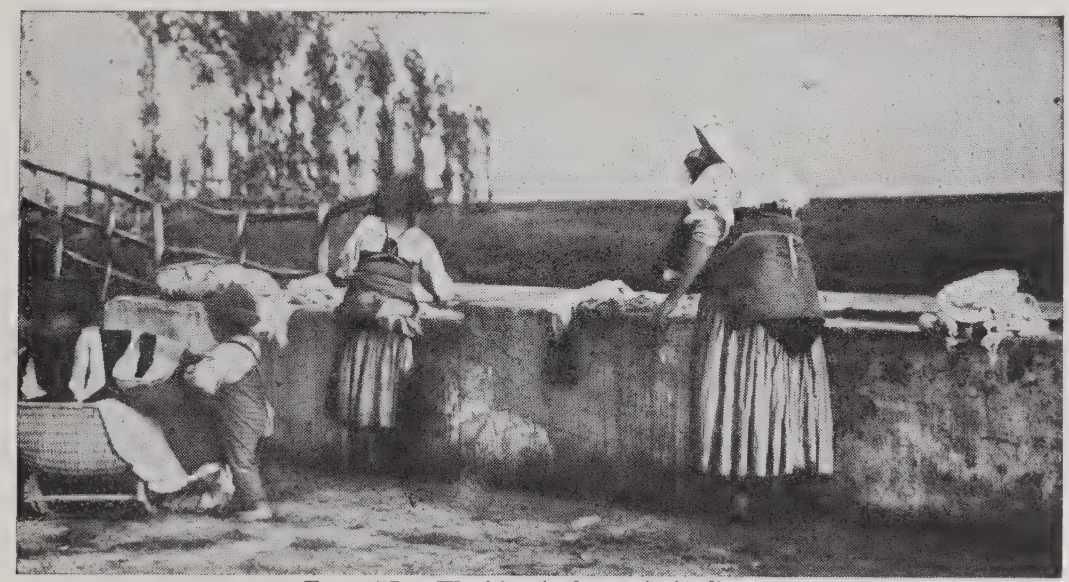


FIG. 177.—Washing in fountain in Rome.

The almost entire dependence upon cold water for cleansing was a significant feature of primitive washing (Fig. 177). Whether it be the woman along the streams of India where it is warm, or at the fountains of Switzerland which are fed by icy mountain streams, there was for a long time no thought of changing Nature's gift into a more comfortable washing medium. In China and many other parts of the world the scarcity of fuel makes it almost impossible for the poor woman to have hot water for washing, even if she had thought of it. In backward lands the hospital, forerunner of cleanliness, finds the hot water supply one of its problems, in some cases depending upon kerosene fuel entirely. It was not until the early part of the nineteenth century that serious thought was given to the question of sterilization, and hot water began to be used more widely. The establishment of public wash houses in cities has brought the opportunity for poor women to have hot water at small cost.

Possibly the most interesting study for us in primitive and contemporary foreign methods is the poor working equipment, and its gradual improvement. We see the woman of Palestine, or perhaps the Philippines—geography plays little part in this study—sitting or crouching by the water, straining to reach clear water and at the same time not drench herself. In such a cramped position she sometimes works a long time at exhausting labor, and at the end of the day has to carry her clothes home. Such a low working surface means extra strain and fatigue for the worker. It is interesting to note, however, here and there attempts to eliminate this handicap (Fig. 178). The Italian woman, for instance, has constructed for herself a kneeling box on legs, which when placed in shallow water brings the worker comfortably near her water supply and yet keeps her quite dry. The box also has an inclined board attached, which is used as a washboard. The women of Jamaica use as a working surface piles driven into the bed of the river. Here they stand and knead their clothes, having to reach only for water. The Swiss woman of today has one of the best working outfits of a primitive kind. She gets her water from the fountain, and either washes there or sets up her equipment along the street. The equipment consists of the inclined washboard mentioned above, wooden tubs, a pail, perhaps a stove and boiler (Fig. 179). The working heights are good, and her methods thorough. She sometimes boils her clothes for an hour and a half, and leaves them over-night in the fountain under the constant stream of cold water. No wonder they are white!

The mechanical history of washing seemed to have been completed with the introduction of washboards, until someone conceived the idea of adapting them to use in machines, and then we had the first washing machines. The earliest types of these represent the rubbing of clothes on stones—the corrugated washer—and the drawing of clothes back and forth in water—the "dolly." Following the introduction of these devices there were

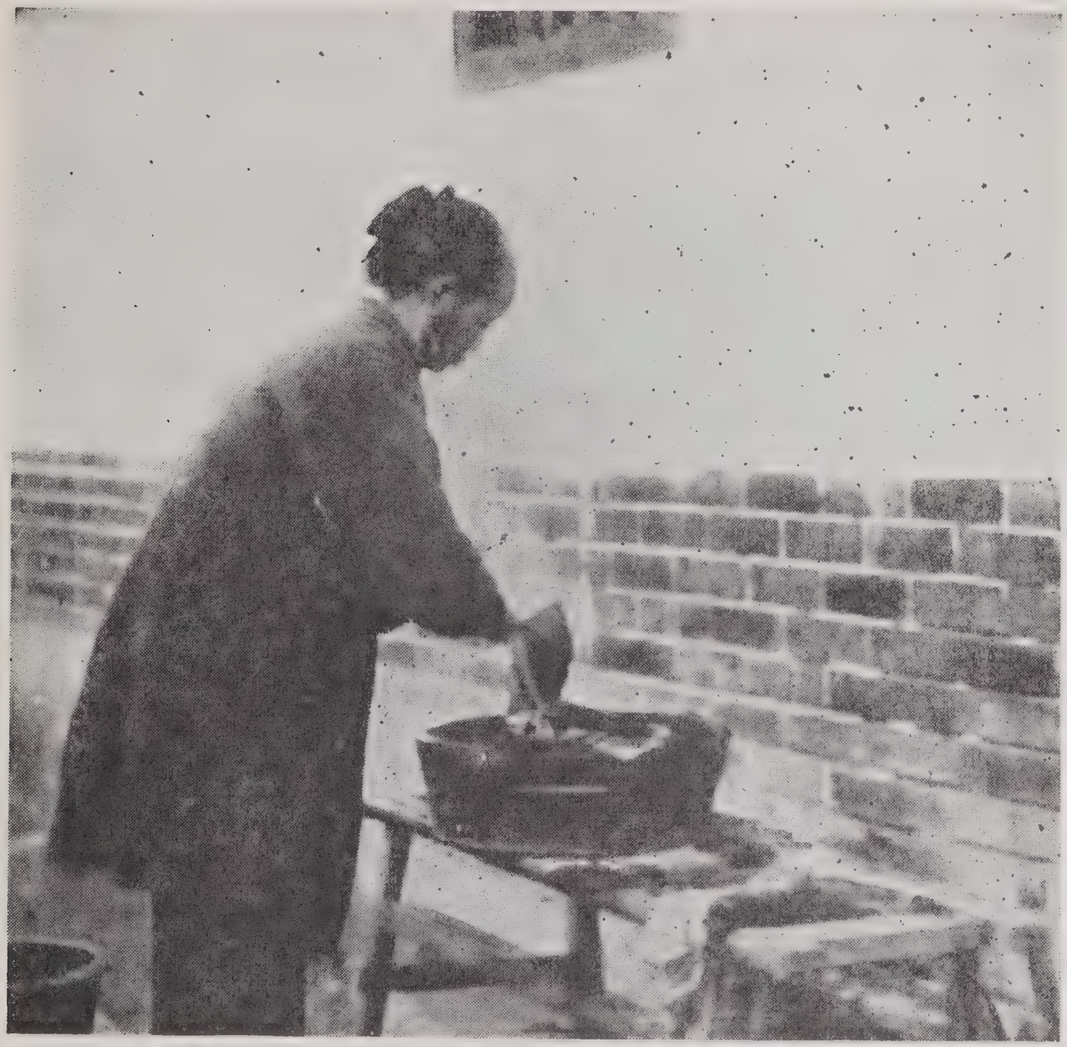


Fig. 178.—A Chinese worker's equipment.

many attempts to produce washing machines which would not only clean the clothes effectively, but would not be too hard on the fabric. It is interesting to note that all of these "new" ideas go back to the primitive methods for their inspiration. The pressure and suction machine, operating by means of a funnel or "vacuum" washer, finds its prototype in the woman of Turkey, who trod her clothes with her feet cupped to form a sort of vacuum. The primitive flopping or shaking method was reproduced in the rotary washer, which rolls the clothes in soap and water. The throwing or slapping method is represented by the oscillating washer. While it still remains true that there is nothing new under the sun, we realize how far these primitive ideas have developed, so that today housewives may have the benefit of power-driven washers that save time, labor, and fabrics.

IRONING did not appear in the history of laundering until long after washing processes had been developed. The clothes were taken carefully from the line or the stones on which they had been spread and were folded and put into deep chests. They had been sunned and aired, and by being folded in stacks they soon weighted themselves smooth. Careful drying also did much to reduce the necessity for ironing. The Chinese woman used her bamboo pole to hang the drying garment in proper shape. The Japanese woman, even today, usually rips her cotton kimono to pieces for washing, and fastens it to a board. It is then washed and dried in much the same way as we cleanse ribbons, or as a traveler dries a handkerchief on a window or mirror. A picture from the time of Homer represents two Greek women stretching washed material before putting it away in chests. The Italians invented a machine called a *mange,* from which we get our mangle. This machine was constructed of several wooden rolls, which were rolled back and

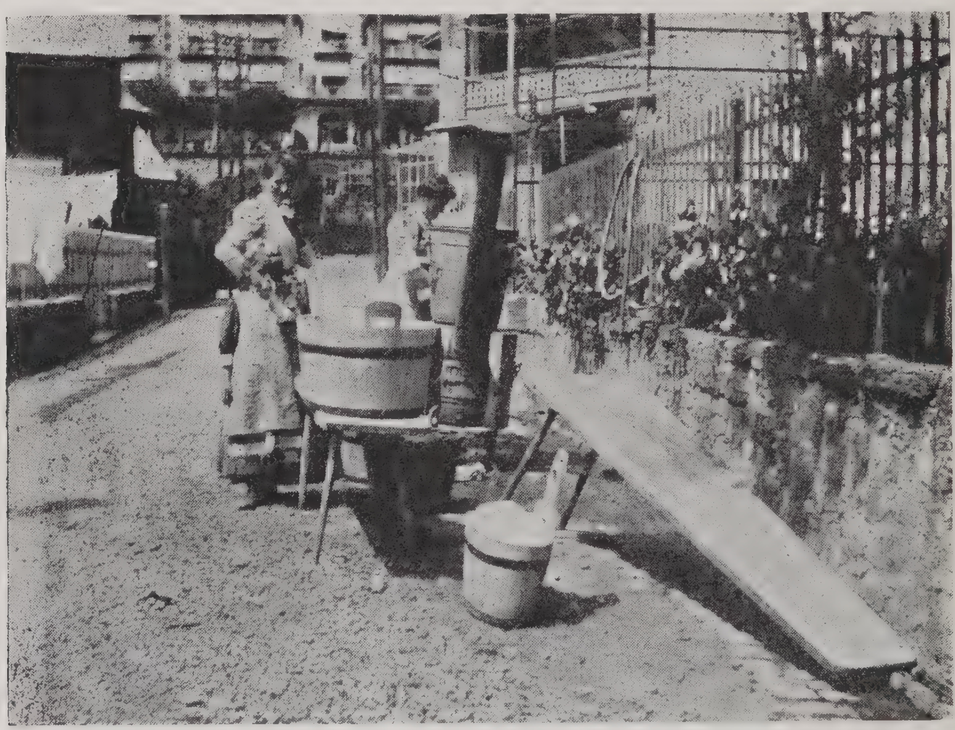


FIG. 179.—Home laundry equipment in Switzerland.

forth over the clothes. The first manges were weighted with stones, and it took two people to roll them over the linen. History tells us that the weavers were the first ones who used an ironing machine. Smoothing irons followed, which were made of steel or brass and were in principle not unlike our present-day charcoal irons. Such irons are used with excellent results in Korea (Fig. 180). An ironing bell, from which our puff iron originated, was used for ironing ruffs. Delicate things were not ironed but were smoothed on glass rollers. The seventeenth-century iron shown in the illustration (Fig. 181) was made of brass, with an inner piece of cast iron which was heated very hot and put into the brass cover. There were several of these iron slugs, so that a hot one might always be ready for use.

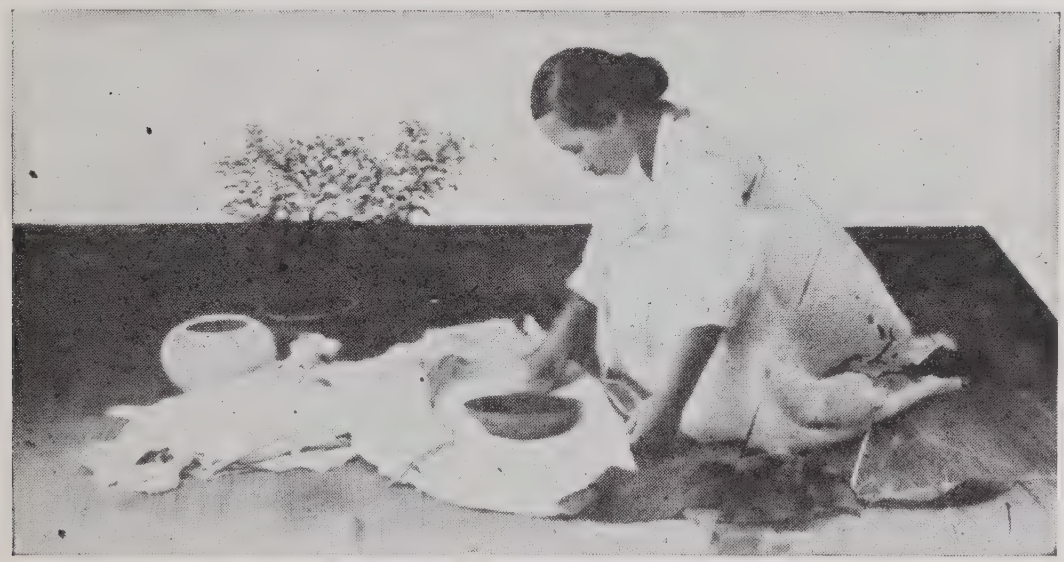
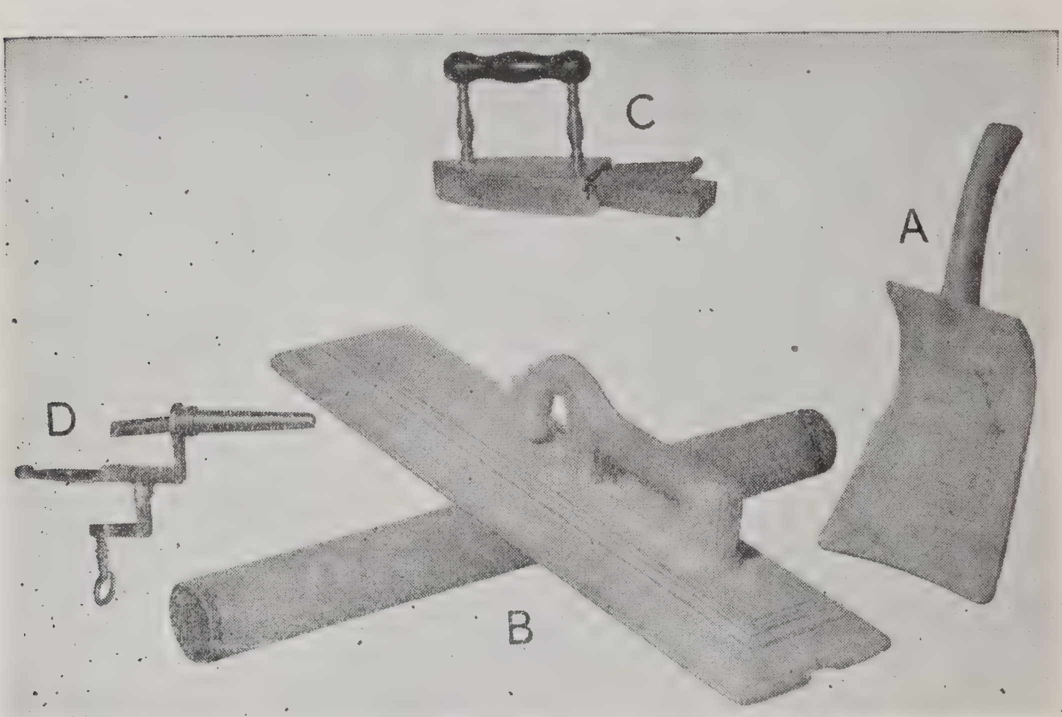


Fig. 180.—Ironing in Korea.

Chemical Development.—About the same time history tells us of Queen Elizabeth and her ruffs, and of the Dutch woman to whom was entrusted the starching of them. Teachers in this art were called professors of starching and, the story goes, were paid five pounds per lesson. It was an intricate art to starch, iron, and plait the ruffs then in fashion. Fig. 182 is an interesting study of a Japanese woman starching a kimono.

It would be difficult to make a chronological history of chemicals used in washing, but as starch came in as a special laundry aid, so the alchemists, forerunners of modern chemists, contributed much to the chemistry of laundering. It seemed necessary to introduce a special cleansing agent, and we find that the chemical used was urine, because of its alkaline nature. It was collected in large urns in central places in the villages from whence it was procured as needed. Even in our mothers' early memory urine was used in dyeing yarn.

Later wood ashes were taken from housewives' fires, covered with water, and the pearl ash or potash which dissolved out, or "leached," was used in washing to aid in the cleaning process. This was a crude introduction of cleansing by means of a strong alkali. In Italy large cauldrons were built for soaking clothes. In these were placed the soiled clothes, the heavy, coarse-fibered garments on top of the pile, the finer ones in the center, and over all was spread a heavy canvas. The ashes were placed on top of the canvas, and water poured through. To deaden the action of the potash, it was found necessary to add kitchen grease, thus making a kind of soap. The soap was of irregular composition, with the potash in excess, so that it not only broke the hardness



Originals owned by Mr. Otto Rasmussen, Oakland, Calif.

Fig. 181.—Eighteenth Century equipment used in Denmark. A. A wooden beater was used to beat wet clothes on a rock or three-legged table after soaking the clothes in lye. B. "Mangle" stock and tree. The flat work was rolled on the stick and then hammered with the mangle board. Owned by "A. R. D., 1771, in Denmark". C. The iron pictured at top is brass, with an iron slug. Each iron had two or three slugs which were heated until red hot. D. Fluting iron, dated 1800, was used to flute "go-to-church" collars.

of the water, but it literally "ate" the dirt, to say nothing of the clothes. These were, to be sure, heavy homespun fabrics with greater resistance than our own present-day lingerie.

The soap made from potash was known as "soft" soap, as it was like a soft, stringy jelly. As the washboard came to be considered a necessity in every home, a "hard" soap was produced which was easier to apply directly to the clothing as it was cleaned on the washboard. This hard soap was a soda soap. Chemistry developed soaps in more perfect chemical composition, until today both chemistry and economics demand that we have a perfectly balanced soap, one in which the proportion of grease and alkali is so measured as to produce a so-called "neutral" soap. (See Chapter VII.)

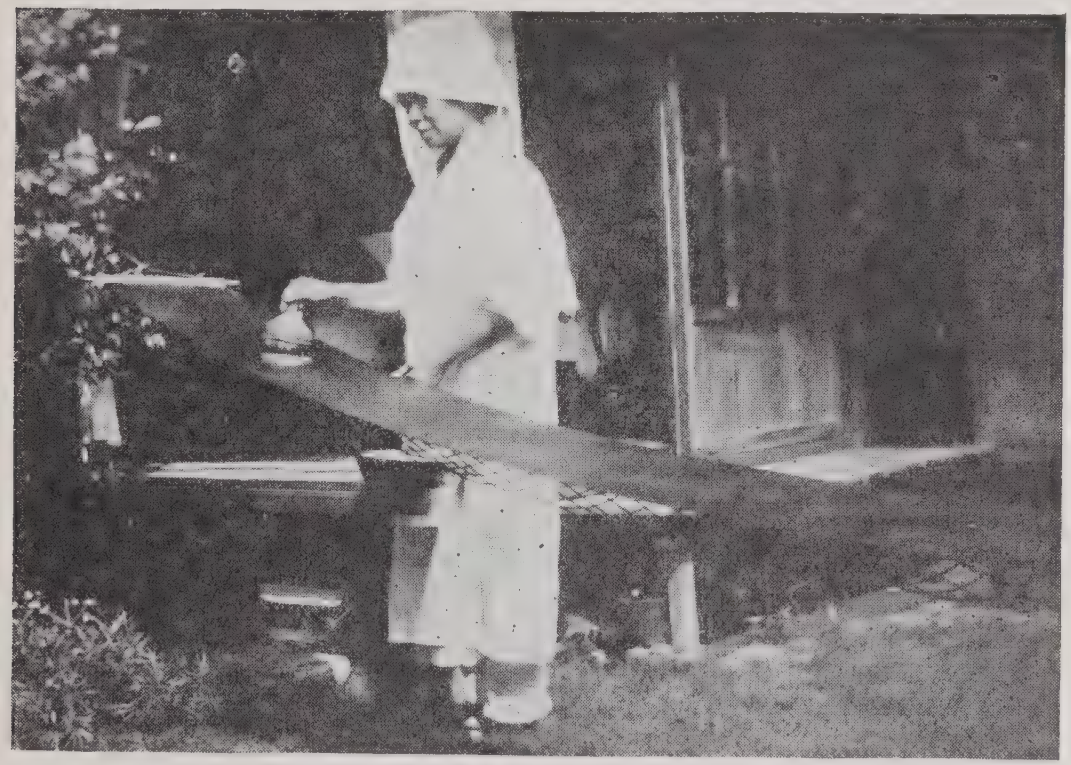


FIG. 182.—Starching lengths of kimono, Japan.

Bluing, like the early soap substitutes, was obtained from a vegetable source. It came from the indigo plant, and for a long time this was the only kind of bluing known. The indigo plant was picked, washed, and allowed to ferment. Fermentation developed the blue color of the indigo, which hardened on drying. It was purchased in large lumps, which were broken into small pieces for use.

Chemistry has contributed many other cleansing agents to our list of laundry aids, as a result of studies of fabrics, of types of soil, and of cleansing agents. As mentioned above, many kinds of stains could not be removed with water alone, or even with soap and water, so we have learned that they are soluble in special chemicals, and can be removed in that way. We have also learned that they can be removed safely, without damage to the fabric, provided the reagents are used by a trained worker. (See Chapter III.)

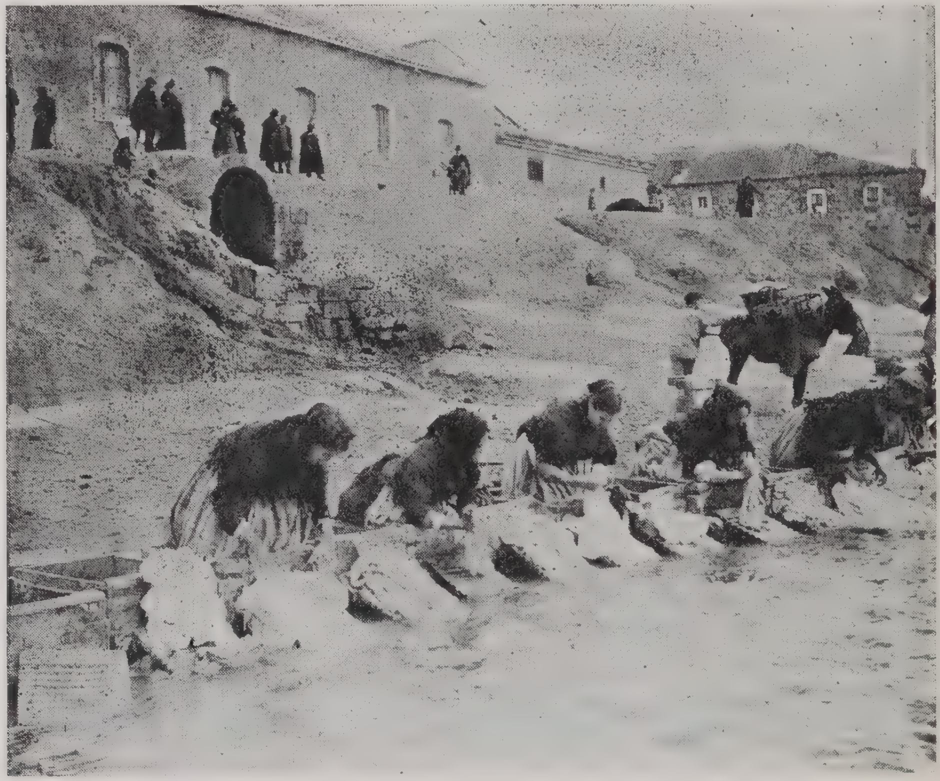


FIG. 183.—Community washing on the banks of the Seine.

Community Laundries.—We have seen that in many countries the occasional wash day is a community day, in which all gather at the common washing place and work together. This idea has grown in modern times into community laundries. The question of sterilizing clothes was first aroused in London in 1832 by the condition of a soiled collar. As a result a poor woman set up a washboiler, soap kettle, and other appliances, and charged washwomen a penny for the privilege of their use. We have here the first public wash-house.

Community laundries are really public wash-houses. In Switzerland they may be covered sheds which are built about the public fountain; or in France, England, or Germany they are docks or boat-like houses on the edge of the river (Figs. 183, 184). The town furnishes the shed, sometimes a stove, and often special drying racks. Countries other than ours have been progressive in their public-spirited action of making it possible for people in crowded tenements and congested localities to have facilities for doing their laundry in a sanitary way. Hamburg built the first public wash-house in 1852, the city furnishing ground and water free of charge. London and Paris both help the poor to do their own family work as well as to gain a livelihood. In Paris there are two classes of *lavoirs*—the *bateau lavoirs* where only cold water of the river is furnished, and the *lavoirs publiques* where hydrant water is supplied. A tax is charged for the latter at hourly rates, but this tax covers the use of tubs, hot water, a wringer, and a drying room where artificial heat is supplied. Such wash-houses are inspected and are under the control of a council of hygiene. We might well copy from foreign countries not only the public wash-houses but also the inspection under the proper authorities that

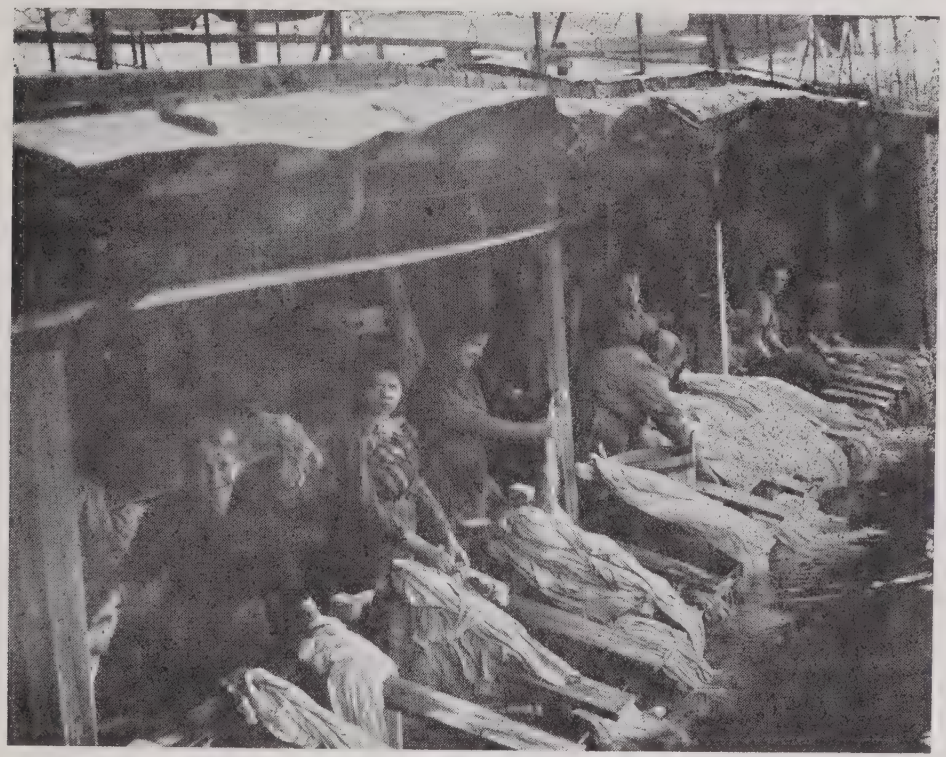


FIG. 184.—Wash shed in France.

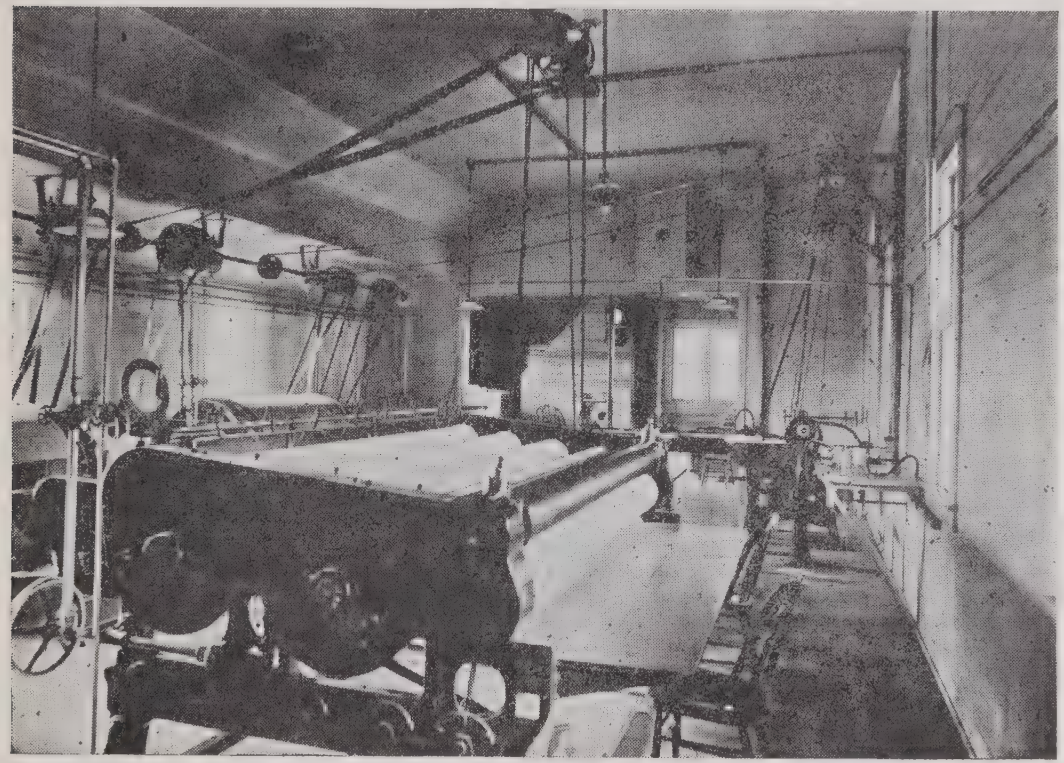
tends to insure clean clothes in clean laundries, providing a sterile and safe service for the community.

In 1842 a public laundry was established in Liverpool. A public laundry differs from a public wash-house. The wash-house is a place provided and equipped by the city where women may come and do their laundry. One big room may be divided into stalls or compartments, each equipped with two set tubs and a wringer. Here the worker may bring her clothes and do her washing in privacy and comfort. Some of these wash-houses have additional labor-saving equipment, which may be used by payment of a fee to cover wear and tear, or in case of power machinery to cover the cost of power. A public laundry, on the other hand, is a laundry equipped with large power machinery and operated under the direction of the city. Here the clothes are washed for the women, for a small fee to cover the cost of operation.

New York has never had a municipal wash-house as have Baltimore, Chicago, and Philadelphia; but through one of the charity organizations, and the untiring work of one or two physicians, a municipal steam laundry was recently equipped in New York. Here the work is done by large compartment power washers, eight bundles at a time, with an allowance of thirty pounds of dry clothes to the bundle. An expert worker operates the machines, and because the washing machine is divided into compartments (see p. 267), each bundle may be kept separate from every other bundle. The cost includes expense of upkeep and operation and—by vote of the patrons—of delivery of the goods. The clothes are either ready to be hung out, or because freed from water in the centrifugal drier, ready to iron. The rates are adjusted to suit the people served, and range from fifty to seventy-five cents per bundle.

Coöperative Laundries have great possibility, especially for rural or suburban localities (Figs. 185, 186). The expense of establishing the plant is not as great as in the city—the coöperators would bring and take their goods, and in several communities the laundry and dairy have been established together with a common power plant. An old barn or mill could be easily converted into a coöperative community plant. It might be suggested that the great requisite for success in such a plant is a director who is a good buyer, who understands accounting, and who is a good manager. From the commercial laundries many good workers may be obtained if one appreciates that such a person is not "only a washwoman."

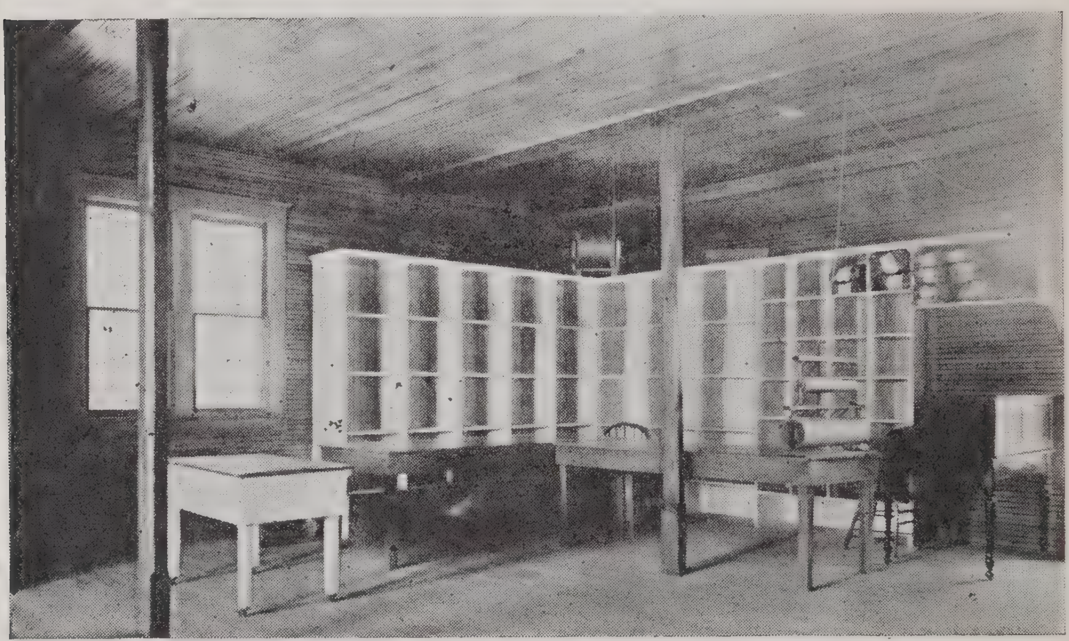
Coöperative laundry work presents an interesting field for the rural teacher or extension worker. She need not organize a coöperative laundry, but it would be a most welcome help if she were trained to help the farm women help themselves by coöperation. Get together a gasoline engine, a good washing machine, some good soap by the barrel, and then make the machine do the work. Let wash day be a Rosy day rather than the usual Blue Monday.



Courtesy of U. S. Dept. of Agriculture.

FIG. 185.—Interior of a coöperative laundry.

Commercial Laundries.—Up to this point we have considered entirely the home as the working field for the laundry processes. And it was so until the nineteenth century. When the housewife not only made the clothing, but spun the yarn and wove the fabrics for the clothing, as well as did the mending and patching, it was natural that laundry work should be counted as one of the inevitable household processes. But as the weaving went to the bigger looms in commercial establishments and as other household processes were taken out of the home, laundry work on a commercial basis began to spread. Just at present we seem to be at the turning point. Shall all laundry work be sent out of the home to be done in the big commercial plants, with big washers and ironers, as "flat work," "wet wash," "pound work," or "piece work"? Or shall housewives, recognizing "the need of standards for the evaluation of knowledge," effect a reorganization in home methods that will meet the test of maximum production and minimum waste? The housewives have yet to study in order to know materials, the best methods and equipment, and to compare the cost and products of commercial work with the products of home work and their cost in fatigue, time, and labor. Just now the housekeeper is swinging with the pendulum, which will finally settle to normal. But the question is, What is normal? The woman pays dearly for ignorance both of the work and of the worker, and must soon realize this fact. When she does, she will certainly not let the pendulum swing all the way back to outworn home methods, but will stop at the point where she can gain standards for her "evaluation of knowledge." This will mean that she will study textiles and the fibers from which they are constructed, and will at the same time learn how to protect and renew her garments. She will be interested to investigate the claims of manufacturers of equipment and cleansing supplies, who say that laundry work is not altogether drudgery, but artistic and scientific accom-



Courtesy of U. S. Dept. of Agriculture.

FIG. 186.—Sorting room of a coöperative laundry.

plishment, followed by the reward of good economic returns that justify the work. She must get out of the rut of indifference concerning the methods by which her clothes are made clean, and must be willing to test the improvements that these manufacturers are offering her. She should be as willing to purchase her laundry supplies, for instance, from supply houses as she is to purchase her groceries at a grocery store, provided she can do so to advantage. She will be surprised and pleased with the results of such efforts to learn about her work. The proof of the accomplishment will be the well-washed and well-ironed garments. A beautifully finished tablecloth or lingerie dress should stir in her the same feeling of satisfaction and pride as does a well-tailored garment or an appetizing dish of food.

This does not mean that good commercial laundries do not do good work, and that poor laundries do not need to be evaluated as below standard. It does not mean that the progressive, thoughtful commercial man has not produced through his economic study better methods and better supplies, nor that his commercial methods have not taught the housewife better ways of production in the home. The commercial man has taught the housewife the value of good materials and methods, but at the same time he must raise his own standards to make his finished products more nearly like homework. Good homework means no losses of garments, no tears, no holes, ironing that has the finish demanded by the woman who buys with a knowledge of quality and who appreciates good workmanship.

The housewife, then, must weigh cost against cost, product against product, and decide what is the best way for her to obtain clean clothes. The answer will not be the same for all housewives, for many factors are involved in the decision. For those who must have outside aid in solving the clean clothes problem, the commercial laundry has offered a variety of methods, three of which may be discussed briefly.

WET-WASH WORK, that is, clothes washed at the laundry and returned still damp to the owner to be dried and ironed at home, is one answer to the problem for the woman who has no facilities for washing, or who is employed all day and cannot be burdened with the extra work of washing. In this method, the clothes are cleansed in a big laundry net in a big washer, with or without other bundles. If one understands the sterilizing power of soap and water, soda and steam, she will realize that clothes can be clean if the washer is not overloaded, if the nets are not too full, and if the garments are free to receive their share of cleansing methods and materials.

There are, of course, good and bad in all things, the wet wash as well as others. The better work is likely to be where small washers are used, so that each set of clothes is kept separate from its neighbor, though even small washers cannot do good work if packed so solidly that soap and water cannot penetrate the clothes. The idea of the wet wash is a good one, and housewives appreciate the saving of work, and the removal of steam and odor from the house. But they should feel a responsibility to demand a high standard of work, and to go to the laundry to see that the clothes are cleaned in a good place and by good methods.

Bundle work is usually "rough-dry" work, that is, clothes washed and dried but not ironed, and it may provide both for starched and unstarched work. So long as starching is often the point at which the housewife fails, this may be the help that will mean the most to her. The clothes are washed, and come home dry, ready to be dampened and ironed.

Family work today means that the clothes are not only washed but ironed as well. They are washed and rinsed in the regular washing machines. Then they are ironed on the special machine designed to take gathers and folds. (See p. 284.) These garments are thus clean, smooth, good-looking, and their laundering, because done by machine instead of by hand, is done at less cost. The thrifty, thoughtful housewife will choose her everyday garments for simplicity of design, cut on plain lines and free from ruffles and tucks, so that they may be ironed on this machine. Thus she may enjoy clean clothing laundered completely by commercial methods without great work or great expense.

Educational Development.—All of these studies show the growth in the development of the laundry industry, both with regard to the washing processes and the equipment used, and also with regard to education. To the author's mind the greatest hope lies in the way in which the commercial man is working for the bettering of the trade. The Laundrymen's Association is splendidly organized, with state and national organization. The meetings are conferences for the improvement of the trade and the determination of ways and means to reach the public. Several magazines are published for the organization, which, while not likely to be read by the housewife, can be of great value in schools as references on trade conditions and progress. The association has made excellent use of research opportunities at Mellon Institute, Pittsburgh, and has published through its office at LaSalle, Illinois, a most noteworthy book on the *Conservation of Textiles.*

The Laundry Board of Trade of New York City has announced evening classes for laundry workers, to be held in conjunction with the city's night school. The teachers are supplied by the association, and the building by the Board of Education. The following outline for the winter's series may be suggestive of the type of work offered:

Organization and Management of Laundries
Laundry Practice
Laundry Chemistry—laboratory work
Laundry Salesmanship
Textiles

Similar courses in other cities are being established, especially in connection with trade schools.

Ex-service men are being trained for laundry work in a vocational school at Chillicothe, Ohio. The plant is a good government building that is well ventilated, lighted by skylight roof, and arranged with splendid, large floor space. Every stage of the trade is taught, and the student's certificate is the guarantee of training. The idea of this school was probably born of the bitter experience we had at the beginning of the war. We had many things to learn when we went to war, of which not the smallest was the startling realization that the Government had clothed and equipped thousands of men, and sent them to camp, without first considering the need of keeping their clothes clean. A leading laundry man was called in to establish camp laundries and also to solve the difficult problem of caring for the men's laundry when they were on the march. This latter necessity called forth a very ingenious invention in the form of a "mobile" laundry unit. Wherever the army and the army kitchen went, there could go also the army laundry. The engine was a tractor with power to pump water from any nearby stream, and to draw the laundry train (Fig. 187). One "car" was a water tank, one contained a washing machine and one an extractor. Records tell us that in twenty minutes the four sections of the train could be assembled in working order (Fig. 188). The clothes could be quickly sterilized and dried ready for use, though of course not ironed. Our mobile laundries certainly did their part to keep the soldiers clean and healthy.

Ohio Mechanics Institute, Cincinnati, has also included laundry work in its course of study. This work is called a Power Laundry Coöperative Course, which means not only coöperation between school and shop, but between pairs of students constituting the team. One week one of the team is in the laundry and one in the Institute, the next week they change places. The course, covering two school years, is interesting as showing the subjects and the expected capacity of the student.

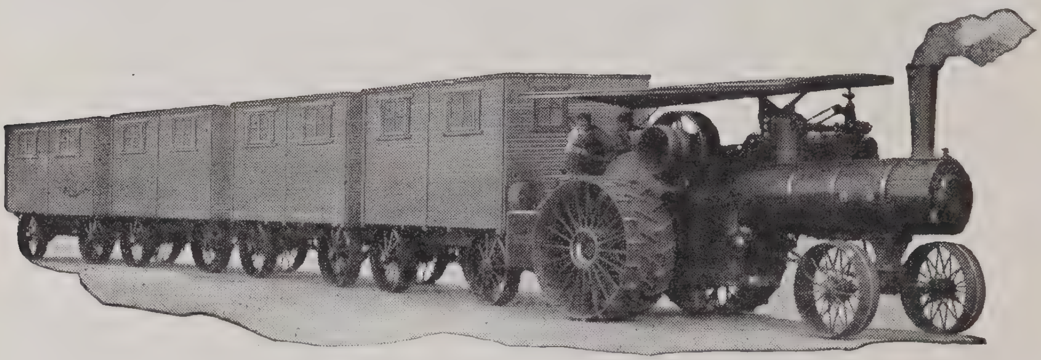


Fig. 187.—Mobile laundry of United States Army.

FIRST YEAR

Class Work	*Coöperative Work*	
Chemistry	Marking room	2 mo.
Woodwork	Wash room	2 mo.
Machine Shopwork	Starching, Drying, Dampening	1 mo.
Elements of Laundry Practice	Ironing room	2 mo.
Business English	Sorting	2 mo.
Steam Engineering		
Heating and Ventilating		
Elements of Electricity		
Motors and Generators		
Power Transmission		
Blueprint Reading		

SECOND YEAR

Class Work	*Field Work*
Chemistry	At the discretion of the coördinator
Cost Accounting	
Advertising and Salesmanship	
Employment and Handling Labor	
Record Keeping and Bookkeeping	

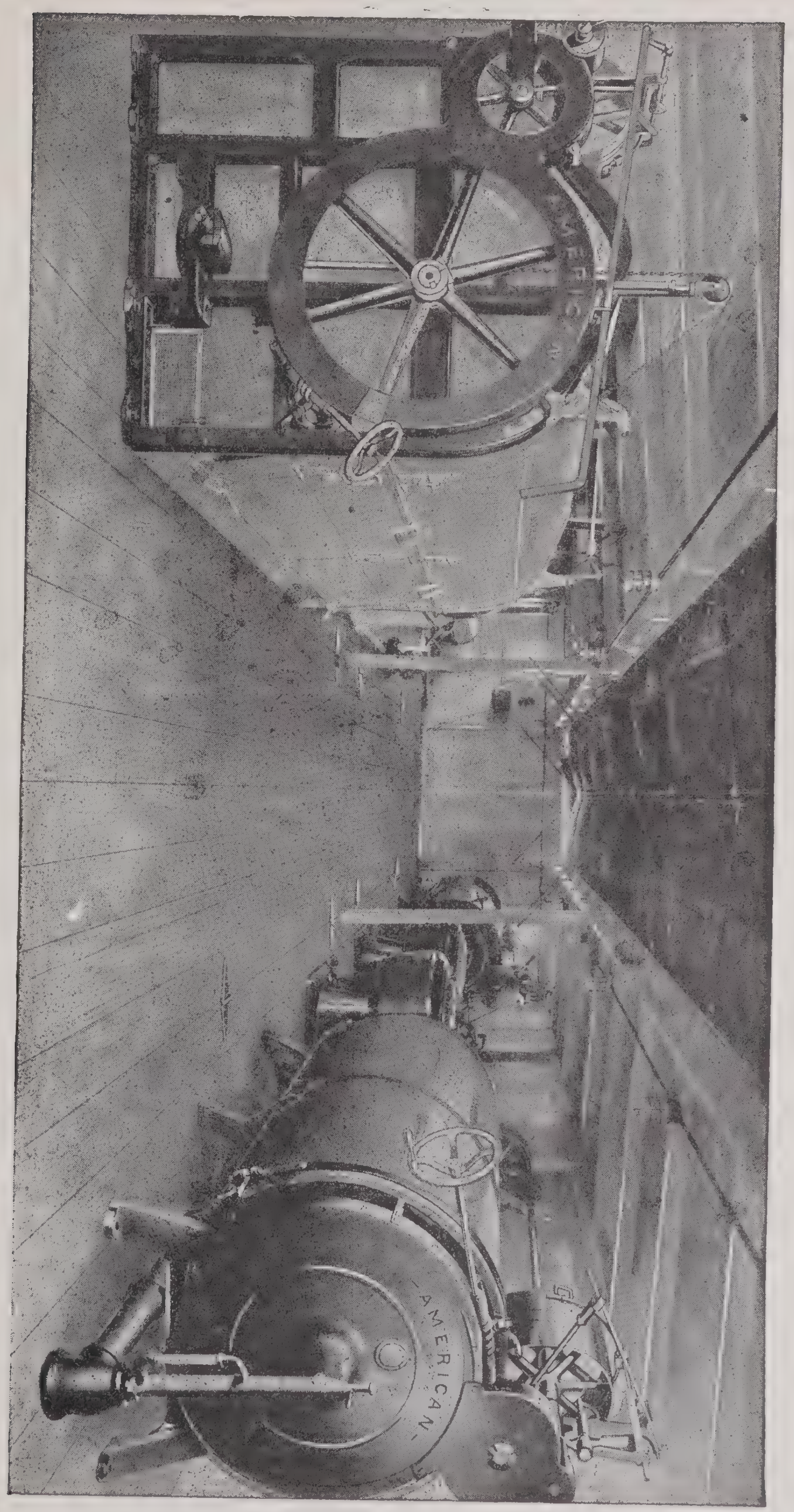


Fig. 188.—Mobile laundry unit set up for work.

Manufacturers have established schools for their salesmen and demonstrators, by means of which these workers can carry into their work a knowledge not only of their machines but also of fabrics, of washing supplies, and of washing methods. In this way they can render very much help to the housewife. The American Washing Machine Manufacturing Association is sending demonstrators to clubs and to home economics classes in high schools and colleges and in other organizations. Through these agencies the Association extends to the homemaker definite and practical help in the selection of equipment and supplies.

The last, but not the least, educational development in the laundry field has been the help that modern laundry practices have brought to the institution, where the laundry department is so important. Too often the institution laundry is in charge of a person who has no training whatever. However, there is a growing realization among institution heads of the need for trained workers in the laundry, and the beginnings made by such schools as the Ohio Mechanics Institute will no doubt inspire other schools to offer similar courses for institution workers.

As we look backward to the primitive beginnings of laundry work and realize how far we have advanced, we feel that the laundry has in some measure kept pace with the increasing complexities and problems of sanitation that civilization has brought in its train. The intelligent housewife can no longer sit by and let laundry work be the last and only household process that is not on a scientific, economic basis. We must give ourselves to the task of meeting the problem in a courageous, cheerful spirit, so that laundry work may take its place as one of the dignified functions of the household.

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INDEX

Abrasive materials in soap, 99
Absorbents
  directions for using, 18
  list, 19
  use, 18
Acetic acid, 131
  as " sour," 112
Acids
  as stain removers, 28
  stains from, 33
  preparation, 130
Administration of laundry, 307
  legal standards, 308
  organization of work, 318
  supervisor, 314
  waste, 320
  workers, 314
Adulteration of fabrics, 6
Albumen stain, 14, 33
Alcohol, 128
Alkali
  as bleach, 23, 129
  as a " break," 74
  as stain remover, 3, 5
  in soap, 96
  stain, 33
Alum, 122, 132
Ammonia, 129
  as bleach, 23
  as stain remover, 33
  in soap, 98
Animal fibers, 4
Aniline blue, 108
Aniline dye stain, 33
Aprons, ironing, 144
  to prepare for wash, 72
Argyrol stain, 33
Artificial silk
  description, 7
  test, 8

Balsam of Peru stain, 33
Bandages and gauze, 79
Baskets, 248, 297
Bed linen, 138
  bluing, 61
  boiling, 57
  folding, 140
  hanging, 139
Bed Linen
  ironing, 139
  ironing by machine, 140
  removing stains from, 138
  rinsing, 59
  soaking, 138
  sprinkling, 139
  washing, 138
Beeswax, 133
Benzine
  danger from, 32
  for cleaning, 126
  for stains, 18, 32
  in soap, 99
Benzol for cleaning, 127
Bibliography, 379
Bichloride of mercury
  disinfectant, 199
  stain, 33
Blankets
  blanket wash, 161
  hanging, 162
  soap solution, 161
  washing, 160
  washing in machine, 79
Bleaches, 20
  for lace, 172
Bleaching
  cotton, 3, 22
  formula, 81
  in machine, 75
  laces, 172
  linen, 3
  silks, 24
  to rejuvenate fabric, 21
  woolens, 23, 164
Blood stain, 33
Blotting paper as grease absorbent, 19
Blues
  cost, 107
  kinds, 107
  properties, 110
  solubility, 110
  tests, 113
Bluing
  for different weaves, 113
  preparation for, 61, 77
  stain, 34
  time required for, 113

Bluing
  to make from liquid blues, 111
  to make from powdered blues, 111
  to make from solid blues, 111
  to remove, 113
  to tint with, 113
  to use, 112
  to use in washing machine, 112
Body ironers, 286
Body linen, 141
  bluing, 141
  boiling, 141
  classification of, 141
  folding, 143, 144
  hanging, 142
  ironing, 143
  ironing by machine, 92, 150
  rinsing, 141
  soaking, 141
  sprinkling, 142
  stains on, 141
  starching, 141
  washing, 141
Boilers, clothes, 216
Boiling of clothes, 57, 74
  for disinfection, 196
  preparation for, 57
Boracic acid, 129
Borax, 129
  as cleanser, 23
  bleach for lace, 172-173
  bleach for woolens, 23
  in soap, 98
  in starch, 122
Bran water, recipe, 157
Brass stain, 34
Building regulations, 308
Butter stain, 34
Butter coloring stain, 34

Candle grease stain, 34
Carbolic acid disinfection, 199
Carbon tetrachloride, 127, 195
Carpets, washing, 185
Caustic potash, 96, 126
Caustic soda, 96, 100, 125
Chalk as absorbent, 132
Chamois gloves, 180
Chemises, ironing, 144
Chewing gum stain, 34
Chiffon, 169, 178
  cloth, 178
Chloride of lime, 131
  in bleach, 23
Chloroform, as stain remover, 18, 128
Chocolate stain, 35
Citric acid, 28, 131
Cleansing
  agents, 124
  dry cleaning, 30, 191
  general rule, 3
  rule for mixed fabrics, 5
  rule for silk, 5
  rule for wool, 5
  special, 178
Clothes
  bags, 250
  boilers, 216
  driers, 237, 278
  hampers and baskets, 248, 297
  nets, 298
  pins, 239
  sprinklers, 239
  trucks, 297
Cocoa stain, 35
Coffee stain, 35
Collar and cuff equipment, 286
  ironing, 92, 147
  starching, 120
  wash formula, 81
Color, setting, 154
Colored clothes, 153
  hanging, 156
  ironing, 157
  removing stains from, 22, 153
  setting colors, 154
  silk underwear, 156
  soap substitutes for, 157
  sorting, 72,
  starching, 156
  wash formula, 81
  washing, 155
  woolens, 164
Cornmeal, 132, 186
Correlations of laundry with other studies, 327
Corduroy, washing, 180
Corsets, washing, 181
Corset covers, ironing, 144
Cotton
  bleaching, 3
  fiber, 2
  mercerization of, 3
  padding, 293
  quilts, 183
  removing scorch from, 4
  removing stains from, 3
  tests for, 7
  washing, 3, 52

Counting
  clothes, home, 44
  clothes, institution, 69
Courses in laundry, 351
Cream stain, 35
Creolin as disinfectant, 199
Crêpe, washing, 169
Cretonnes, washing, 184
Curtain stretchers, 239, 279
Curtains, washing, 184

Dampeners, 286
Detergents
  action, 19
  definition, 19
  directions for use, 20
  recipe, 161
Development of laundering, 357
  chemical, 365
  commercial laundries, 371
  community, laundries, 368
  coöperative laundries, 370
  educational, 374
  mechanical, 358
Diapers, 152
Disinfection of clothes, 196
  care of clothing, 197
  home methods, 196
  special, 198
Doeskin gloves, washing, 180
Down quilts, washing, 183
Draperies, washing, 184
Drawers, ironing, 144
Drawn work, washing, 176
Dresses, ironing, 144
Dress shields, washing, 181
Dressings, to cleanse, 79
Driers, 237, 278
  conveyor, 279
  curtain, 279
  home, 238
  steam, 278
  stocking, 279
Dry cleaning, 191
  danger, 192
  essentials, 192
  to teach, 194, 350
  with carbon tetrachloride, 195
  with gasoline, 193
Drying
  blankets, 162
  colored clothes, 62, 156
  curtains, 184
  freezing, 62
  silk, 167, 170
  wool, 161
Dust stain, 35
Duvetyn, washing, 170
Dye
  aniline stain, 33
  choice of, 189
  powders, 191
  soaps, 191
  stain, 35
  tints, 190
Dyeing, 188
  method, 190
  preparation for, 189

Egg stain, 35
Elastic goods, cleansing, 181
Electric irons, 244
Electricity, 222
  terms, 222
  to read meter, 226
Embroidered centerpieces cleansing, 136
Equipment
  for stain removal, 32
  for teachers, 333
  home, 213
Equipment
  institution, 266
  care, 301
  operation, 305
  safety rules, 305
Ether, 128
  magnesia, 128
Extracting
  method of loading machine, 84
  regulation of time, 85
Extractors, 271
  danger from, 272
  operation, 84, 305
  size, 273
  types, 271

Fabrics, 1
  adulteration of, 6
  mixed, 5
  tests for fibers, 7
  weaves, 8
Faded material, treatment, 21
Fat stains, 15, 35
Feathers
  fancy, 182
  pillow, 183
Felts
  life, 293
  refelting, 93
  types, 292

Fibers, classification, 2
  cotton, 2
  linen, 3
  silk, 5
  tests, 7
  wool, 4
Finishing machines, collars, 289
Fire
  extinguishers, 250
  regulations, 310
Flatwork ironers, 240, 280
  ironing, 87, 138
Fly paper stain, 35
Folding
  body linen, 143-151
  importance, 66
  table linen, 135
Food stains, 14
Formaldehyde, fumigation, 200
Formalin, as disinfectant, 199
Formulas, wash, 80
Freezing of clothes, 62
Fruit stain, 36
Fuller's earth, 132
Fumigation, 200
  formaldehyde, 200
  sulphur, 201
  to seal a room for, 200
For rugs, cleansing, 186

Gas irons, 245
Gasoline
  cleaning, 30, 126, 193
  danger, 192
  disinfectant, 192
  engines, 227
  ring, 194
  spotting, 194
  storage, 193
Gauze and bandages, washing, 79
Gloss on clothing, removing, 182
Gloves, washable, 171, 180
Glue stain, 36
Gold lace, cleansing, 176
Grass stain, 36
Grasshopper stain, 36
Grease stains
  candle, 36
  fat, 35
  oil, 36
  solvents for, 18
  treatment, 30
Gum arabic, recipe, 167

Hair padding, 292
Hampers, clothes, 248
Hand washing machines, 219
Handkerchiefs
  ironing, 144
  infected, care of, 197
Hanging
  blankets, 162
  bed linen, 139
  body linen, 142
  colored clothes, 156
  silk, 167, 170
  table linen, 135
  to prevent tears, 62
  wool, 161
Health regulations, 311
History of laundering, 357
Home laundry
  arrangement, 207
  equipment, 213
  location, 204
Honey stain, 37
Hydrochloric acid, 129
  to dilute, 130
  to remove stains, 18
Hydrogen peroxide, 132
  as bleach, 24, 132
Hydrosulphite of soda, 24
Hydrochlorous acid, 130

Imitation fabrics, tests, 7
Indelible ink stain, 38
  pencil stain, 37
Indigo blue, 107
Ink
  for marking clothes, 46
  stain on silk, to remove, 24
  stain on white woolen, to remove, 27
  stain, 37
  special kinds of stains, 38
Inorganic stains, 12, 15
Institution laundry
  administration, 307
  courses in, 342, 354
  equipment, 266
  establishment, 254
  methods, 68
Insurance
  fire, 310
  social, 313
Iodine stain, 38
Ironers
  attachments, 284
  body, 286
  changing covers, 93

Ironers
  collar and cuff, 287
  felts for, 292
  flatwork, 280
  heat for, 280
  muslins, 294
  operation, 305
  pressure test, 91
  refelting, 93
  size, 282
  to feed, 89
Iron holders, 248
Iron rust
  formed by bluing and soap, 110, 114
  removal in machine, 78
  stain, 38
Ironing
  boards, 242, 291
  by machine, 87, 138, 140, 150
  machines, 240, 280
  presses, 285
  tables, 242
Ironing of
  body linen, 63, 92, 143
  collars and cuffs, 92
  colored clothes, 157
  embroidery, 63
  flat work, 87, 138, 140
  silk, 167
  wool, 164
Irons
  care, 247
  choice, 247
  kinds, 243

Javelle water
  for lace, 173
  recipe, 29
  uses of, 29
Jersey cloth, washing, 180

Kerosene, 127
  in soap, 99
  stain, 38
Knitted garments
  silk, 170
  underwear, 150
  wool, 160

Labor laws, 313
Laces
  bleaching, 172
  gold, 176
  pinning, 173
  removing stains from, 172
Laces
  silver, 176
  tinting, 172
  washing, 172
  yokes and sleeves, 176
Lamp black stain, 39
Laundering, development of, 357
Laundry, home
  closets, 212
  equipment, arrangement, 207
  equipment, discussion, 213
  equipment, list, 202
  floors, 205
  location, 204
  supplies, list, 202
  ventilation, 207
  walls and ceiling, 205
  windows, 207
Laundry, institution
  See Institution Laundry
Laundry nets, 72, 298
Laundry courses, 349
Lead foil stain, 39
Leather stain, 39
Legal standards for laundry, 308
Lime soap
  cause, 57
  removal, 58, 74
Linen
  bleaching, 3
  fiber, 3
  life, 319
  removing scorch, 4
  removing stains, 3
  storage, 319
  tests, 7
  washing, 52
Lysol as disinfectant, 199

Machine oil stain, 39
Machinery
  care, 301
  description, 213, 266
  operation, 305
Magnesia, 132
  benzinized, 132
  etherized, 128
Mangles, 240, 280
Marking
  charts, 47
  methods, 45
  place, 49
  pins, 299
  tags, 299
Marquisette, cleansing, 169, 184

Meat juice stain, 39
Medicine stains, 39
Mending
  economy, 43, 68
  in the institution, 68
Mercerized cotton, 3
Methods for
  colored clothes, 153
  disinfection, 196
  dry cleaning, 191
  dyeing, 188
  fumigation, 200
  institution laundering, 68
  laces, 172
  silk, 166
  special cleaning, 178
  stain removal, 26
  white clothes, 52, 134, 141
  woolens, 159
Mildew, 16, 39, 63
Milk stain, 39
Mimeograph ink stain, 38
Mixed fabrics, 5
Modified soda, 125
Moistening machine, collars 286
Mordants for colored clothes, 154
Mucus stain, 39
Mud stain, 40
Muslins for ironers, 294

Neckties, cleansing, 169
Nets, 72, 298
Nightdresses, ironing, 144

Oil stain, 36
Organic stains, 14
Organization of work, 318
Overalls, washing, 181
Wash formula, 82
Outlines, teaching, 351
Oxalic acid, 130
  as bleach, 24, 173
  as "sour," 108, 131
  recipe, 30
  to clean washing machines, 130

Paint stain, 40
Paraffin
  stain, 40
  use in starch, 121, 127
Perspiration stain, 40
Pillows, washing, 183
Wash formula, 82
Pinning laces, 173
Pitch stain, 41
Plant, establishment of
  equipment, list, 265
  floor plan, 258
  floors, 257
  location, 254
  machinery, 263
  routing, 256
  size, 255
  ventilation, 257
  walls, 257
  windows, 257
  woodwork, 257
Potassium binoxalate, 131
Potassium permanganate, 129
  as bleach, 24, 129, 173
  recipe, 30
  stain, 41
Power
  types of, 222
  washing machines, 227
Preparation of the wash, 43
  counting, 44
  marking, 44
  mending, 43
  sorting, 43
Press ironers, 285
Printers' ink stain, 38
Prussian blue, 108, 110
Punch stain, 41

Quilts, washing, 183

Rag rugs, washing, 186
Rain coats, cleansing, 182
Rain spots, to remove, 182
Recipes
  aniline blue, 111
  blanket wash, 161
  bran water, 157
  detergent, 161
  gum arabic, 167
  Javelle water, 29
  oxalic acid 30
  potassium permanganate, 30
  soap bark, 157
  soap, home-made, 99
  soap in large quantities, 100
  soap solution for wool, 161
  soda solution for soap, 100
  solution for washing machine, 102
  starch water, 157
  starches, 121, 123, 142
Refelting of machines, 93
Removal of stains, 26
Research studies, 346

Ribbons, washing, 167
Rinsing, 59, 76
Rosin, 98
Rugs, cleansing, 185
Rules for
  care of machinery, 303
  colored clothes, 153
  employees, 316
  laces, 172
  operation of machinery, 305
  safety, 305
  silk, 166
  special fabrics, 178
  stain removal, 29
  white clothes, 52
  wool, 159

Safety
  devices, home, 225, 245, 250
  devices, institution, 272, 284
  precautions, 126, 192, 225, 235
  regulations, 309
  rules, 305
Salad oil stain, 41
Sal soda, 125
Scorch, removal of, 4
Score cards for teachers, 341, 345
Self-heating irons, 244
Setting color, 154
Shaking of clothes, 87
Shields, dress, washing, 181
Shirts, ironing, 144
Shoe polish stain, 41
Silk
  artificial, 7
  bleaching, 24, 166
  crêpe, washing, 169
  cleansing rules, 5, 166
  ironing, 167
  knitted garments, 170
  manufacture, 5
  marquisette, washing, 169
  neckties, cleansing, 169
  removing stains from, 166
  renewal, 167
  ribbons, washing, 167
  stiffening of, 5, 167
  tests, 7
  velvet, cleansing, 169
  velvet collars, 170
  velvet, steaming, 169
  washing, 166
Silver lace, cleansing, 176
Silver nitrate stain, 41
Skirts, ironing, 144
Sleeve boards, 242
Soaking of clothes
  economy, 52
  with soda, 53, 74
Soap, 95
  alkali in, 96
  as cleanser, 95
  as disinfectant, 95
  extra cleansers in, 98
  foreign materials in, 96
  home-made, 99
  powder, 103
  purchasing, 102
  quality, 95
  solution for washing machine, 102
  storage, 103
  substitutes, 102, 157
  table of ingredients, 97
  tanks, 296
  tests, 105
  to add soda, 103
  to soften water, 74
  weight substances, 96
Soap bark, 157
Social insurance, 313
Soda, 125
  for soaking ("break"), 53, 74
  purchasing, 103
  solution for soap, 100
  tests, 105
  to build into soap, 103
Sodium bicarbonate, 103, 125
Sodium hydrosulphite, 24
Soil, types, 12
Soiled linen, storage, 319
Solvents, list, 18
Sorting clothes, 43, 69
"Sour," aniline, 108
  for bluing, 112
Special cleaning, 80, 178
Spotting, 194
Sprinklers, 239
Sprinkling clothes, 63
Stains
  albumen, 14, 33
  classification, 12
  food, 14
  grease, 15, 36
  ink, 15, 37
  iron rust, 16, 38
  methods of removal, 17, 33
  mildew, 16, 39
  removal by soaking, 52
  rules for work, 29

Stains
  sugar, 14
  table, 33
  working outfit, 32
  unknown, 15
Starch, 115
  accessories, 121
  as absorbent, 19
  cooker, 274
  directions for making, 117
  directions for using, 117, 142
  extractors, 276
  for collars and cuffs, 120
  kinds used, 116
  recipes, 121, 123, 142
  solubility of, 117
  substitutes, 122
  tinting, 122
  uncooked, 61, 121
Starch water, 157
Starching
  body linen, 141
  clear, 119
  colored clothes, 156
  heavy, 119
  in the machine, 118
  machines, 275
  outfit, 237
  reasons for, 61, 141
Sterilizer, 295
Stockings, 152, 170
Storage
  closets, 212
  soap and soda, 103
  soiled linen, 319
Stoves, laundry, 215
Stove polish stain, 41
Sulphur, 129
  as bleach, 23, 164
  fumigation, 201
Sugar stain, 14
Suggestions for teachers, 326
Sunlight
  as bleach, 22, 172
  as disinfectant, 196
Sweaters
  silk, 170
  wool, 160, 161

Table linen
  bluing, 61
  boiling, 57
  folding, 135
Table linen
  hanging, 135
  ironing, 135
  ironing by machine, 138
  removal of stains, 134
  rinsing, 59
  soaking, 134
  sprinkling, 135
  washing, 134
Tags for marking laundry, 299
Tapestries, washing, 185
Teachers, suggestions for, 326
Teaching outlines, 349
Testing laboratories, 346
Tests for
  blues, 113
  fibers, 7
  soap, 105
Ticking, washing, 183
Tinting, 26
  starch, with bluing, 122
  laces, 172
Tints, 190
Tobacco stain, 41
Towels, washing, 144
Trucks, 297
Tub trucks, 298
Tubs, 213
Tumblers, 277
  tumbling of clothes, 86
Tumeric, 41
Turpentine as stain remover, 128

Ultramarine blue, 107, 110
Underwear, 150, 160, 170
Unknown stains, 15
Urine stain, 42

Varnish stain, 42
Vaseline stain, 42
Vegetable fibers, 2
Vegetable stains, 42
Veils, cleansing, 180
Velvet
  cleansing, 169
  collars, 170
  steaming, 169
Velveteen, 180
Ventilators, 270
Verdigris stain, 42
Voile, washing, 178

Wagon grease stain, 42
Waists, ironing, 144

Wash formulas for
  bed pillows, 82
  bleach, 81
  collars and cuffs, 81
  colored clothes, 81
  overalls, 82
  white clothes, 80
Wash boards, 215
Wash tubs, 213
Washable gloves, 180
Washing
  appliances, 219
  bed linen, 138
  blankets, 79, 162
  body linen, 141
  by machine, 55, 73
  colored clothes, 153
  definition, 53
  in nets, 72
  laces, 172
  method, home, 53
  method, institution, 73
  preparation, 43
  silk, 166
  table linen, 134
  wool, 159
Washing machines, power
  capacity, 233
  care, 236, 303
  cleaning, 82
  drain, 210, 269
  gauging load, 73
  home, 227
  institution, 266
  materials, 233, 268
  motors, 222
  operation, 235, 305
  pipe connections, 269
  placement, 269
  size, 269
  to set up, 234
  types of, 227, 266
  ventilators, 270
Washing soda, 125
Waste, 320
  cause, 320
  classification, 321
  elimination, 323
Water, 124
  as stain remover, 12
  in soap, 96
  motors, 226
  softeners, 74, 125, 236, 296
  spots, 42
Waterproof ink stain, 38
Wax stain, 42
Waxes, 133
Welfare
  rooms, 262
  worker, 317
Wine stain, 42
Wool
  bleaching, 5, 164
  cleansing rules, 159
  felt, 292
  fiber, 4
  quilts, 183
  shrinkage, 4, 159
  tests, 7
Woolens
  blankets, 79, 162
  colored, 164
  drying, 161
  hanging, 162
  ironing, 164
  removing stains from, 5, 27, 159
  soap solutions, 161
  washing, 160
  wringing, 160
Workers, institution laundry, 314
  number, 315
  rules for, 305, 316
  selection, 315
  welfare, 317
Wringers, 215
Wringing, 57
  wool, 160

Yellowstreaks, 60, 110

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DUE CAM APR 30 '91

SEP 2 5 RETURN
DUE CAM OCT 26 '94
OCT 1 8 RETURN
Due Cam NOV 02 '94
RETURN NOV 04 '94
RETURN FEB 06 '01

TT 985 B17 1923 c.1
Balderston, Lydia Ray.
Laundering home--institution,
SCI/TECH
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